"SUNLIGHT" TREATMENT

THIRD EDITION.

A handy guide for practitioners [illegible] many techniques and treatments utilizing demonstrating "applications" such as violet rayand arc, various ~~[illegible]~~ The second half of the book is dedicated to illustrations and descriptions of electro-medical apparatus.

"Vita" Glass - chez Pilkington
Mont

1924 - pg 115

"SUNLIGHT" TREATMENT

A CONCISE GUIDE

for the use of

ULTRA-VIOLET IRRADIATION

in

ACTINO-THERAPY

THIRD EDITION

PUBLISHED BY AJAX. LTD. (PUBLISHING DEPT.),
117, Central Street, London, E.C.
PRINTED BY THE LEWES PRESS, LTD.

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PREFACE
TO THIRD EDITION

IT has been most gratifying to us that the first and second editions of this work have been rapidly sold out and the enormous demand compels us to issue another edition, far in advance of anticipations.

In this edition we have introduced some new features, including articles by Drs. Francis Howard Humphris, M.D., Ernest F. C. Dowding, M.R.C.S., W. Annandale Troup, M.C., M.B., Helen C. Scott, M.R.C.S., which we think will prove to be of great interest.

The tabulated matter giving particulars of Treatment has been found to be of great service.

A number of new apparatus have become available since the publication of the first and second editions, particulars of which will be found in these pages.

All the information has been brought up-to-date to keep pace with the rapid strides that have been made in the Science of Actino-Therapy.

This concise work is not intended to be a comprehensive or dogmatic text-book, but simply a handy Guide for the use of Medical Practitioners who have not the leisure for exhaustively studying technique, but who nevertheless wish to utilise the great benefits of Ultra-Violet Irradiation, "Sunlight" Treatment in their practices.

This information has been gathered from various authoritative sources and compiled for ready reference by a practical expert in Actino-Therapy, who possesses both academic credentials and the qualifications of an experienced operator.

THIRD EDITION

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FOREWORD

GLOSSARY OF TECHNICAL WORDS USED IN THIS WORK.

These definitions are given as a foreword as they will undoubtedly be of interest to all readers and of advantage to those who have not had the opportunity of studying things electrical in particular.

A.C.—Alternating Current. An oscillating current of varied frequency—a current which periodically varies in magnitude and direction or constantly reverses the direction of flow. This current has no polarity. Two alterations from a period or cycle and number of periods or cycles per second is known as the frequency or periodicity. The periodicity of the average circuit in England is about 50 cycles per second, although in some instances it amounts to higher figures up to 100 cycles.

Anode.—A positive electrode.

Ampere.—Unit of measurement of electric current. Compared to water supply it represents the volume or quantity of water that leaves the tap. (See other electrical units, Volt, Ohm, Watt, etc.)

Arc.—Is the gap between two points of an electrical circuit across which the current jumps. In the case of a Carbon Arc Lamp the two points consist of carbon rods and the current jumping the two rods causes an intense illumination. If specially prepared carbons, such as polimetallic, are used, the flame throws off not only the visible rays of the spectrum, but invisible rays, such as Ultra-Violet from the violet end and infra-red from the red end of the spectrum.

Conductor.—This is the term applied to material through which electric currents flow freely. All metals, for instance, are "conductors," copper being mostly employed as being a good conductor, but iron is a bad one, opposing too much resistance to the passage of the current.

Cathode or **Kathode.**—A negative electrode, *i.e.*, the positive end of a D.C. Mercury Vapour Burner is known as the Anode and the negative end the Cathode.

D.C.—Direct Current. A current flowing continuously in one direction—has two poles P (Positive) and N (Negative), and current always flows from P to N. The signs used are + Positive and − Negative.

Electrical Circuit.—Path taken by electrical current from its generator through a conductor and back again.

E.M.F.—These initials signify Electro-Motive Force, that is to say, the actual power of the current as expressed in voltage, or in other words, the difference of potential.

Electrode.—An electrode is a Conductor accessory to which electrical current is conveyed from the generator or mains to apply it to any given spot or place.

Fuse.—In electrical sense a fuse is simply a means to limit the passage of electric current to a given strength. The usual means is to bring the mains to an insulated block and there interpose a lead or wire of special material that will "fuse" or burn when it is attempted to pass too great a volume of current through it.

The limitation is to prevent accident and fire by the burning or fusing of the wiring leading to the lamps, apparatus, electric stoves, etc., for which the current is being used; for instance, the installation in a private house may be wired to withstand a maximum current of 10 amperes. A

"fuse" wire therefore that will fuse at any point beyond 10 amperes is used; if the whole of the current of 10 amperes is required for lighting, etc., and then an extra apparatus, say requiring 5 amperes more is introduced, the fuse will "blow" or burn. All electrical circuits however are always installed to carry a certain amount of "overload," and there is no objection to using say 12 or 15 amperes momentarily, periodically over a circuit only installed for say 10 amperes, should occasion arise.

Generator.—Any appliance or instrument that creates an electrical current.

H.F.—These initials stand for "High Frequency," which is the ordinary electric current transformed by multiple interruptions, condensation and oscillation to a point that these latter exceed one million per second, when disagreeable sensation to the body is eliminated.

Insulator.—This is a term applied to any material that opposes such a resistance to the passage of electric current that the quantity that does pass through it is negligible. Materials such as Quartz, China, Glass, Vulcanite, Marble, etc., etc., are good insulators; none are perfect, but for practical purposes they are sufficiently efficient.

Milliampere.—1,000th part of an ampere—used in medical electricity.

Ohm.—Unit of measurement of electric resistance. The measurement of the resistance to a current passing through 10 ft. of pure copper wire of 100th of an inch in diameter.

Rheostat.—An instrument for regulating the power of electrical currents without opening or breaking the circuit.

Switch.—A switch is a means of cutting off electrical current from one point to another. The displacement of the switch knob will cause a gap over which the current cannot jump, which gap is filled when the operation is reversed. There are various kinds of switches for various purposes. The ordinary house switch is for current of 5 amperes, just the "up" and "down" or turning movements that everyone knows.

A 10 ampere switch for electric stoves and various apparatus of the same kind is more strongly built. There is then the switch to turn the current on smoothly and cut it off rapidly to prevent arcing, called "quick break" switches.

There are rotary switches which are always turned clockwise, such as those used on "Ajax" Mercury Vapour U.V.R. apparatus, both for "on" and "off."

Multiple-way switches, etc., etc.

Transformer.—An instrument for modifying the electromotive force of an alternating current. The term is sometimes used erroneously to mean a "converter," which is for transforming Alternating Current into Direct Current by means of a motor and generator.

U.V.R. — These initials stand for "Ultra-Violet Ray (s)" which subject is dealt with in other parts of this volume.

Volt.—Unit of measurement of electric current pressure. Compared to water supply it represents the pressure or force at which the water leaves the tap, not the volume. (See other electrical units, Ampere, Ohm, Watt, etc.)

Watt.—Unit of Power. 1 Watt is the product of 1 Ampere and 1 Volt. 1,000 Watts = 1 Kilowatt or 1 Board of Trade Unit. By knowing any two factors the third can always be determined as follows:

Volts ... = Amps × Resistance or Ohms

$$\text{Resistance} = \frac{\text{Volts}}{\text{Amps}}$$

$$\text{Amps} \ldots = \frac{\text{Watts}}{\text{Volts}}$$

Watts ... = Amps × Volts

A CONCISE GUIDE

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HISTORICAL

ALTHOUGH the rays of the sun were used for healing and tonic purposes several thousand years ago, and the ancient Romans (to mention only one race) exploited their uses very freely, the practice of "Sunlight" Irradiation, as we know it, belongs to the present century.

Truly, it was in 1893 that Professor Finsen published his work upon the remedial action of Sunlight, and through the interest taken by the late Queen Alexandra in her countryman, Finsen, and her zeal for the relief of suffering, the London Hospital acquired a Finsen installation. But beyond its utility in the cure of Lupus, the medical world did not seem to fully appreciate or exploit the possibilities of "Sunlight" Treatment, until the present century opened.

In the year 1903, Dr. Rollier started to expose patients to the cold mountain sunshine at Leysin, on the borders of French-Switzerland. Most people smiled, and said the patients would die; but they did not die. What was more to the point they were cured, and the treatment acquired the cachet of success.

The climatic conditions in this country do not permit of the general adoption of Rollier's methods, and although Sir Henry Gauvain, upon Hayling Island, and the Sunlight League, at Ken Wood, Hampstead, make use of the sun's rays to some extent, all treatments in this country are based upon the generation of the curative rays by artificial means.

NATURAL AND ARTIFICIAL SUNLIGHT

IN the following pages we have endeavoured to briefly describe the origin and manner of Artificial Sunlight Treatment (Ultra-Violet Irradiation) and the various generating Units that are used.

Sometimes the substitutes we invent are painfully lacking in the virtues of the natural forces they purport to resemble, but this is not the case with Artificial Sunlight. Dr. Rollier, our greatest living authority, states:

> "Sun and ultra-violet rays (artificial sunlight) bear much the same relation to one another as crude drugs do to their synthetically prepared chemical substitutes."

Artificial Sunlight, in fact, permits us to harness and concentrate the curative rays, whilst we can omit or minimise certain of the sun's rays which are inimical to our purposes.

VIOLET RAYS AS DISTINCT FROM ULTRA VIOLET RAYS

AT the present moment there is considerable confusion with the two terms "*Ultra-Violet Rays*" and "*Violet Rays.*"

We must state at once that there is a distinct difference and there is no similarity whatever in their mode of application or their therapeutic effects.

One often finds Ultra-Violet Rays described as "*Violet Rays,*" and *vice versa,* especially in some establishments where high-frequency machines are in use. The terms are improperly used generally through ignorance, and it will be our aim to fully describe the difference.

There is in general demand and use a small monopolar high frequency machine with which vacuum glass tubes are used as electrodes.

When an electrical current of high potential is passed through this vacuum tube a fluorescence, *violet in colour,* is caused, hence the common use of the term "*Violet Rays*" in connection with high frequency machines. There certainly is some very small percentage of Ultra-Violet Rays in this source of illumination, but whatever there may be is entirely absorbed by the glass tube, and plays no part whatever in any therapeutic effects derived from a high frequency machine of the type described.

The term "*Ultra-Violet Ray*" used in connection with these machines is therefore misleading.

The following is a brief description of a High Frequency current.

It is one of extremely high potential as we have already intimated, and is obtained by transforming an ordinary electric current by multiple interruptions, condensation and oscillation.

We know that if we produce an interrupted current of over 100,000 oscillations per second the sensory nerves are incapable of pain and this current can then be applied to the body without any discomfort.

High Frequency current can be given as a general application with ordinary vacuum electrodes or in the form of sparks, affleuves or brush discharges.

We hope it will be seen therefore that rays produced by a current of this description cannot in any circumstances be described as "*Ultra-Violet Rays.*"

The term "*Ultra-Violet Rays*" is arrived at by the fact that the Ultra-Violet Rays are found just beyond the violet end of the spectrum. They are chemical in action and are invisible.

What they are, what they do, how they are artificially obtained, etc., is dealt with very fully in other sections of this book, and it will, we trust, be clearly seen what confusion is brought about by alluding to *Ultra-Violet Rays* as *Violet Rays.*

Other terms, such as "Artificial Sunlight," "Sunlight," "Sunrays," "Artificial Sunshine," etc., are often used in referring to Ultra-Violet Rays, and if not strictly correct, are at least appropriate.

THEORY OF LIGHT

Light can be described as a sensation of brightness aroused in our eyes by what Sir Oliver Lodge defines as an "electro-magnetic disturbance of the ether," and embraces the visible and invisible rays.

The undulatory theory considers that light is propagated as a succession of waves in the ether, much as waves in water are propagated.

The blending of the seven visible colours of the spectrum gives us white light.

The Ultra-Violet Ray is invisible to the naked eye, and has luminous frequencies greater than those of the visible spectrum.

As Theodore Lyman says: "The attention which the ultra-violet received was largely due to the fact that the terrestrial sources of light, such as the arc and spark discharge, are particularly rich in radiations of a quality more refrangible than those which affect the human eye. It has resulted from the activity in this field that the spectra of the elements between wave-length 4,000 and 2,000 have been very carefully studied and the position of their lines accurately determined."

ACTION OF ULTRA-VIOLET RAYS

The Ultra-Violet Ray is also known as an Actinic Ray, because it has the power to excite chemical action and its effects on photo-sensitive paper are more pronounced than the other light rays.

The Rays with a wave-length of more than 3,000 Å have no skin action.

A general exposure of a part under treatment is more effective than just locally treating it, because more blood is then brought under the influence of the light's action.

The generally accepted theory is that the therapeutic effects of Ultra-Violet Radiation are brought about by the absorption of the rays by the blood stream (serum and corpuscles).

Another authoritative view is that the therapeutic action takes place upon and through the nervous system.

Both schools of opinions have their followers and Dr. T. Clyde McKenzie, M.B., Ch.B., devotes a whole chapter to the subject in his book, *Practical Ultra-Violet Light Therapy.*

There is no doubt, however, that the germicidal and bactericidal properties of Ultra-Violet Rays are their greatest virtues, it is also equally certain that the whole metabolism of the body is quickened and the general health and vitality benefited by regulated exposure to Ultra-Violet Rays.

U.V.R. UNIT OF MEASUREMENT

The unit of measurement generally adopted for measuring the wave lengths of Ultra-Violet Rays is known as the Ångstrom Unit—symbol Å—and represents one ten-millionth of a millimetre.

The micron—symbol μ, and the millimicron—symbol $m\mu$ or $\mu\mu$, are two other units of measurement and the relationship between these three units is shown in the following table :—

Unit.	Symbol.	Millimetres.
Ångström	Å	... ... One ten-millionth.
Millimicron	$m\mu$ or $\mu\mu$	... ... One millionth.
Micron	μ	... ... One thousandth.

It will be seen that these are convertible terms. To convert millimicrons to Ångstrom Units, multiply by 10, and to convert Ångstrom Units into millimicrons divide by 10.

The Ultra-Violet band ranges from 136 A to 3900 Å, and the most important range for medical work is between 2400 Å and 3000 Å.

The table of wave-length of the complete spectrum is set out below :—

Gamma (or Radium) Rays ...	.1 Å. to .015 Å.
X-Rays	.1019 Å. to .15 Å.
Ultra-Violet	.136 Å. to 3,900 Å.
Visible spectrum	3,900 Å. to 7,700 Å.
Infra Red	7,700 Å. to 5,000,000 Å.
Hertzian oscillations	5,000,000 Å. to several kilometres.

WAVE LENGTH MEASUREMENT

It is possible, as already stated, to measure the length of ether waves. At the Ultra-Violet extremity of the spectrum the length is but a small fraction of a millimetre; the length increases as the opposite end is approached until we come to the Hertzian waves which range from a few centimetres to several miles. The short wave has a high frequency of vibration; the long wave a low frequency.

Wave-length is obtained by measuring the distance between the crests of two waves, amplitude is half the perpendicular distance between the crest and the trough of the wave, frequency is the number of times per second a cycle of movement is repeated at one point, to arrive at the frequency of vibration of a wave-length divide the velocity by the wave-length. Wave velocity is obtained by multiplying wave length by wave frequency, it is generally accepted that for all ether waves velocity is 186,326 miles per second.

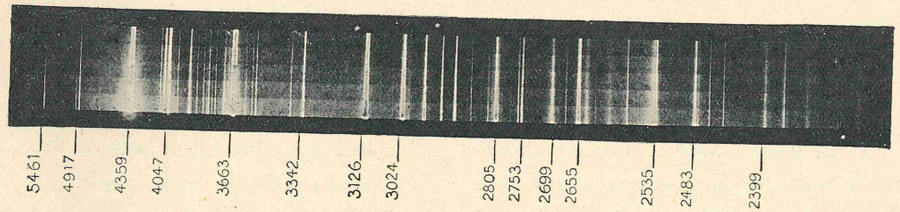
THE SPECTRUM

Reprinted from *Sunlight and Artificial Light*, by Harold Wigg.

We are able to appreciate with the eye certain ether waves which we call light; our eyes are sensitive also to a variety of colours, which are produced physically by ether waves of varying length or frequency of vibration. The length of these waves can be measured; those which cause the sensation of red are the longest of the waves which we call light, while those which stimulate the sense of violet are the shortest. A beam of light can be analysed into its constituents by passing it through a prism, which has the effect of bending the waves out of their course. Varying wave-lengths are bent or refracted at varying angles and accordingly sorted out or graded in what is known as the spectrum. The spectrum is "continuous" if waves of all lengths are present, but if there be a definite selection of wave-lengths only, the analysis produces a "discontinuous" or "line" spectrum. The visible spectrum was demonstrated by Newton; it is seen as a coloured band—violet, indigo, blue, green, yellow, orange, and red. It is but a small portion of the whole; beyond the violet end is a wide range of shorter waves, or waves of higher frequency of vibration, which are called ultra-violet rays, and beyond this region come the X-rays generated in vacuum tubes and the gamma rays emitted by radium. All these rays can be photographed, because they have the power of affecting certain chemicals. At the other end of the spectrum, below the red, come the infra-red rays; they cannot readily be photographed, but they generate heat when their energy is absorbed by matter. Far below these come the relatively long waves used in wireless telegraphy, sometimes referred to as Hertzian waves because they were discovered by Hertz.

There is no known limit to the length or frequency of ether waves, but it is acknowledged that all ether waves travel at the same pace, and it is believed that their velocity is about 186,000 miles per second.

QUARTZ BURNER MERCURY VAPOUR SPECTRUM-PHOTOGRAPH.



This illustration shows spectrum-photographs of the Arc of the "Ajax" Mercury Vapour Lamp with five different exposures, i.e., for 5, 10, 20, 40 and 80 seconds, the longer exposures giving the blurred effect.

Intensity and volume of the Ultra-Violet Rays emitted are particularly well in evidence.

DEGREES OF ERYTHEMA

BEARING in mind that what we seek to achieve is a profound physiological reaction, we shall clearly best secure this by *exposing the greatest practical area of the body to irradiation.* This is naturally done in general and constitutional maladies, but it should also be borne in mind even when dealing with localised troubles.

A very few tests will reveal the golden mean between a desirable actinic erythema, and undesirable blistering of the skin, and the dosages noted in the following pages will provide a sound basis for the average patient.

An excellent definition of the degrees of erythema we reprint from *Artificial Sunlight,* by Dr. Francis Howard Humphris, M.D.:

First Degree: Slight reaction, practically no subjective symptoms, slight reddening of the skin, no visible exfoliation. Daily treatments can be given.

Second Degree: Mild reaction as of slight sunburn, definite reddening, slight exfoliation. Daily or alternate days.

Both these, which may be classed as stimulative erythemata, are accompanied by a minimum of protoplasmic change with some capillary enlargement. It is bactericidal, and is an effect more sought after in the general body application of the rays.

Third Degree: Intense reaction, as of severe sunburn; intense reddening, epidermis can be peeled off in large strips. Four or five or more days' intervals, the intervals depending upon the time of return to normal of the skin.

This may be termed a regenerative erythema, and is a hyperæmic reaction which stops just short of blistering. It is stimulating and bactericidal as is the stimulative erythema dose; but in addition, the maximum capillary reaction furnishes a regenerative capacity to the exposed area. It is the most used and the most useful of the reactions, and among its many indications are various skin lesions, infected mucous membrane or glands, *e.g.*, tonsils.

Fourth Degree: Blister formation. Ten or more days' intervals.

This is classified as a destructive erythema. It begins with a temporary stimulating hyperæmia. This gives way to the regenerative hyperæmia, and goes on till it affects the protoplasm of the cells, and occasions exudation and ultimately blister formation, the exudate raising the superficially destroyed cellular layer.

PROPORTIONATE EXPOSURE

IT should be remembered that fair people are more susceptible to the rays than dark persons, and females more than males. The following table will be found a convenient guide to proportionate exposure of various parts of the body:

(*After Pacini.*)

	Mins.
Chest, Abdomen, Face, Back, Groin, Nape of Neck, Throat, Ear	1
Anterior Arm	1½
Posterior Arm	1¾
Posterior Leg	1¾
Anterior Leg	2
Dorsum Hands	5
Palms of Hands	15
Soles of Feet	25

By proportionate exposure is meant the varying responsiveness of different parts of the body. Supposing that after local irradiation of the lumbar region with two minutes' exposure, you desire to irradiate the anterior parts of the legs, the proportionate responsiveness (see above table) is as 2 to 1, therefore the proportionate exposure for the legs will be four minutes.

In practice, begin with the feet and lower limbs. Any hypersensitiveness on the part of a patient will then reveal itself before the more delicate regions are irradiated, and exposures can be modified accordingly.

The eyes, both of patient and operator, must always be closely screened with tinted goggles; those used by the operator being of sufficiently light tint to enable inspection of patient and time-watch to be made whilst the treatment is in progress. A specially useful goggle is the "Ajax," which has been found to best answer all requirements. It has the additional advantage of being low-priced.

There are many dosage meters available on the market, but a timepiece designed for the purpose is perhaps preferable. Perfectly correct dosage depends upon so many factors that each individual case has to be treated strictly on its merits, and knowledge of the subject is better gained in actual practice, based upon data already acquired, such as that tabulated in this volume.

ANGLES OF INCIDENCE

INSTEAD of a highly technical discussion about differentiation in the angles of incidence of the rays, we propose to reduce this question to the simplest possible proportions, as follows:

> A patient placed directly under a lamp will receive greater irradiation than if he or she was at one side of the lamp.

In other words, the rays strike most powerfully upon a subject at right-angles to the lamp, and less powerfully upon a subject at some more acute angle, say 45°.

As it is frequently the case that the rays pass from lamp to patient at or about an angle of 45°, all that is needed is to remember that with varied angles of incidence, exposure must be varied also. The following is the correct scale of increase—in practice it will be found sufficient to carry the approximate increase in mind, and add it to the exposure by simple arithmetic. Our aim is to furnish the simple facts needed in practical use, leaving to the standard text-books the detailed discussion of angle incidence.

At angle of 90° = 1
,, ,, 60° = 1⅕
,, ,, 45° = 1⅖
,, ,, 30° = 1½

EXAMPLE: *A patient whose dose when exposed directly under the lamp (angle 90°) is 2 minutes, will require an exposure of 2 minutes 48 seconds if exposed at an angle of 45°, e.g., one-and-two-fifths the exposure at 90°.*

SKIN EFFECTS

THE pigmentation which follows the irradiation is a biological effect, which protects the body from absorbing too much "Sunlight," by interposing a pigmented screen between the rays and the bodily tissues.

Pigmentation to that degree is right and proper, but under prolonged exposure blistering may result. Blisters do not leave scars, or exercise any untoward influence, but the pain and inconvenience accompanying them make it desirable to scale the times of exposure in accordance with the response and tolerance exhibited by the patient.

In dealing with this question we cannot do better than quote again from *Artificial Sunlight,* by Dr. Howard Humphris, M.D. :

> "Conspicuous among the many errors into which workers who are commencing their study of Actino-Therapy are apt to fall, is that of talking (and thinking) too much of 'burns.' The general public which derives its medical opinions from newspaper paragraphs and scare headlines in the lay press is frequently harrowed by reading vivid accounts of 'X-ray burns.' Such injuries, however, do not exist in the realm of ultra-violet radiation elsewhere than in the imagination of uninformed writers. There may, of course, be actinic erythema, but this is very different from a burn. Similarly there may be a blister with the water-cooled lamp, either intended as a necessary treatment for nævus or mole, or it may follow upon an overdose from an air-cooled lamp, and the best treatment for this latter is the exhibition of the 3,000 candle-power lamp. Sampson, indeed, lays it down in his *Physiotherapy Technic,* that 'the very best treatment for any kind of burn, from X-ray burns, through the heat and chemical burns to sunburn, is properly administered actino-therapy.' Burns of all kinds heal much more quickly if given small and frequent doses of ultra-violet irradiation. The epithelium grows more rapidly and the wound assumes a healthy aspect in less time than by any other method with which I am acquainted. Also the ultra-violet radiation reduces the pain."

The outer layers of skin will peel and flake off under correctly-timed treatments—this is a normal phase, and even when the peeling is accompanied by irritation, no special attention is needed. Irritable parts may be dusted with talc, or smeared with any oleaginous preparation.

HINTS TO BEGINNERS IN ACTINO-THERAPY

BY

FRANCIS HOWARD HUMPHRIS, M.D., F.R.C.P., M.R.C.S., D.M.R.E.

IT is of course absolutely necessary that the physician should be equipped with a good armamentarium. The secret of success lies, above everything else, in the choice of the appropriate form of energy. It goes without saying that all the apparatus should be of the best possible quality, and of the most modern pattern. Then, too, it should be kept scrupulously clean (whether in daily use or not) and at regular intervals it should be returned to, or visited by, the manufacturers for expert examination and overhauling. Again, as with every other portion of the medical man's equipment, so it is with this, to secure good results it is imperative for the physician to familiarise himself thoroughly with its possibilities and with the best procedure in application. Neglect of this precaution is merely asking for trouble. Incidentally, it injures the cause and the good name of actino-therapy.

The worker in the field of ultra-violet radiation must ever be on his guard against many stumbling blocks and traps that lie in his path. He will assuredly encounter a host of errors born of ignorance or prejudice. Perhaps the chief evil is the almost indiscriminate use of artificial sunlight by those who are insufficiently acquainted with its use, properties and dangers. A very small amount of accurate and careful instruction is needed by a person of average education and intellect, in order to make him or her quite competent to administer Artificial Sunlight, but it is necessary that that small amount of instruction actually be given and received before the buyer of apparatus begins the use of it.

An increasingly gratifying measure of success has attended the application of ultra-violet light in the treatment of various tuberculous diseases, more especially in cases of tubercular bone disease and lupus and other skin disorders. It has been found to have a good effect in eczema and rickets, and also in cases in which it is necessary to stimulate the activity of the skin for the purpose of relieving congestion in the internal organs.

Arc baths, once or twice a week, would do much to maintain good health and prevent rickets, rheumatic fever, skin diseases, lessen catarrhs, etc. Ultra-violet radiation puts up the general resistance of the body to disease, and promotes good health and the sexual power of citizens who, by sedentary indoor lives, have become depressed and out of condition.

The general Arc Bath affords a natural, simple and valuable stimulant of the health function of the body. In addition to the fact that it causes an increase of calcium and phosphorus in the blood, ultra-violet rays produce inflammatory reaction and determination of increased blood, lymph, and lymphocytes to the part treated; the radiation furthermore changes the immunising power of the body. The result is that a general exposure of the diseased part is more effective than a local exposure. This is because more blood is then brought under the influence of the light's action. In the administering of ultra-violet radiation very great benefit is given to a variety of sickly people; and not only is it certain that, in two or three years' time, artificial sunlight

will become general as a winter pick-me-up, but those who have once realised the salutary effects of artificial sunlight will not limit its benefits to the winter time, but will rather make a habit of it throughout the year.

Pain in the deeper structures can be relieved by the ultra-violet rays. This may be due to the superficial hyperæmia produced or it may be caused by attacking the peripheral nerve irritation of the area according to the view that there is reflex relation between many areas of cutaneous surface and various internal organs.

Technique in ultra-violet radiation (and, indeed, in every other therapeutic measure) resolves itself into a question of reaction. According to the intensity of the light, so does the reaction appear on the normal skins from two to twelve hours after irradiation. Turrell is quoted as having said that the measure of a therapeutic effect is the amount of reaction induced. And in some cases this is so, especially when giving treatment with the short bactericidal waves, but when using the long wave-lengths, as in the general body bath, his experience shows that a reaction showing a mild or scarcely perceptible erythema yields the best results. Now, the reaction is directly proportional to the intensity of the radiation, and as the intensity of the radiation varies with the amperage employed, it would seem a simple mathematical matter to define and limit the reaction by the amperage employed. But there are several other factors that have to be taken into consideration. It is difficult to lay down the exact dose, because each individual skin varies in its power of resistance to light. Not only does one skin vary from another, but the skin of one individual will vary—the variation depending upon the situation of the area, and the amount of air and sunlight that it may have received. An appreciation of these factors can only come with experience.

Yet another factor that must be considered is the disease or condition for which ultra-violet rays are being used. For instance, cases of severe anæmia, certain nervous affections, and those showing a high blood pressure, require a minimum dose of radiation, falling short, indeed, of a first degree erythema; whereas in cases of surgical tuberculosis, rickets, neuralgia, skin diseases, and for those patients suffering from a deficient endocrine action a second or third degree erythema should be produced, a stimulative erythema with sufficient intervals of rest, the object of the rest being not only that the skin should be restored to normal, but also that fatigue be avoided, which would occur should the treatment be given too frequently.

Betwixt these two classes come many physical states in which a dose midway between these two extremes is indicated, somewhere between a definite first and a mild second degree erythema.

Among such conditions are numbered neurasthenia with depression, disorders of digestion, anæmia, asthma, and convalescence after illness, and especial stress should be laid upon the value of this treatment to the fagged business or professional man, the over-worked or over-playing society woman, and the weak undeveloped child with no demonstrable pathology which would indicate either surgical interference or a satisfactory prescription of medicine—these begin to flourish with ultra-violet treatment. Its influence upon the general conditions of these patients is most remarkable. The irritability and fractiousness go; the appetite returns, with increase of body weight and strength. They no longer catch

colds readily, and, with the improvement in the blood conditions, they feel day by day in every way brighter and brighter as their resistance to disease increases.

The contra-indications to ultra-violet light baths are in conditions allied to exophthalmic goitre, quiescent phthisis, a grumbling appendix, or chronic duodenal ulcer, unless approached with the greatest care as regards minimum doses and slowness of increase. Any trace of œdema, especially if accompanied by erythema, should be regarded as a grave warning and call for discontinuation of treatment. Diabetics easily develop a dermatitis, so any attempt to produce an erythema is distinctly contra-indicated, even if such a patient is treated with ultra-violet radiation.

ARTIFICIAL SUNLIGHT AND ITS THERAPEUTIC USES

BY

FRANCIS HOWARD HUMPHRIS, M.D., F.R.C.P., M.R.C.S., D.M.R.E.

WE would draw our readers' attention to the above book, the fourth edition of which has just been published, as Dr. Howard Humphris is undoubtedly one of the leading specialists in actino-therapy in this country.

This book—the author states in the preface to the Fourth Edition—is intended to be of service to those practitioners of medicine who have already had their attention aroused to the possibilities of this still little known region of physical therapeutics, and it is particularly suitable for use by those medical men who are still in the rudimentary educational steps of actino-therapy.

The fact that this is the fourth edition of this work is sufficient evidence of its utility. In this edition there is a revision of, and considerable addition to, the preceding editions, and in the exceedingly modest preface the author has omitted to state that an entirely new chapter has been added on the subject of Red and Infra-Red Rays. This edition will receive a hearty welcome by all those interested in actino-therapy.

The chapter on Red and Infra-Red Rays contains much that is new—at any rate in this country—and the book concludes with the original glossary, but, as is the book itself, enlarged and improved.

Copies of this book can be obtained from the Publishing Dept., Ajax Ltd., 117 Central Street, London, E.C.1. Price **10/6.** Post free **11/3.**

"ONE fact has been noticed and noted by all careful clinicians with sufficient experience in the treatment of disease in children by Actinotherapy, and that is that the effect on the mentality of the children is marvellous. Their very nature seems to change. Irritability flies away and a bright good nature takes its place.

I venture to submit that it is no longer a theory, but a fact, that Sunshine, natural or artificial, has a very beneficial action upon the psychology of the child."

Dr. F. HOWARD HUMPHRIS, M.D., in a paper read at the National Conference on Maternity and Child Welfare, July, 1927.

ACTINOTHERAPY AND THE GENERAL PRACTITIONER

BY

W. ANNANDALE TROUP, M.C., M.B., Ch.B.

ALTHOUGH treatment by ultra-violet radiation has been in use for several years in all the large hospitals in the country, and clinics have been established in almost every large town, this treatment is only now, but slowly and surely, filtering through to private practice.

No hospital can be considered to be fully equipped without an ultra-violet ray department, and similarly no general practitioner can consider himself fully equipped to treat his patients and prevent their ailments and diseases unless he is cognizant, not only of the theory, but of the technique of administration of these rays.

The practitioner is not doing his patients or himself justice if he relegates this treatment, which is most beneficial and curative in skilled hands, to the unqualified and uninitiated, whose knowledge on this subject does not usually extend beyond a manufacturer's catalogue. It is obviously impossible for the unqualified to understand the physiological or bio-chemical action of these rays.

If the treatment is done "under medical supervision" it is imperative that the practitioner, who is alone responsible, should have educated himself on the subject. *But far and away better still, he should carry out the treatment himself.*

He will undoubtedly obtain better, more rapid and more satisfactory results, and there will be no disasters.

I have frequently heard it said by doctors that they have not the time to administer this treatment. But surely they will find time when it is recognised that a great number of the diseases they are treating by other methods can be cured in a much shorter time by ultra-violet radiation, and a great number of maladies which have previously resisted all other forms of treatment have yielded to ultra-violet radiation in a remarkably short time. A great deal of time can be saved and suffering alleviated more rapidly in many ailments if ultra-violet ray treatment is used instead of the old-fashioned remedies or in conjunction with some of these remedies.

It must always be borne in mind how these rays act. There is a local and a general action.

Local Action.

Production of erythema, which, after a course of treatment, is followed by pigmentation. These rays have an analgesic effect on the nerve endings in the skin, and by reflex action the central nervous system is influenced. Activation of cholesteral, contained in the cells of the skin and the formation of Vitamin D.

General Action After Absorption.

(*a*) Increase of blood contents of Iron, Iodine, Calcium and Phosphorus.

(*b*) Increase in white blood corpuscles and therefore increased bactericidal power and increased general immunity to disease.

(*c*) Increase in red blood corpuscles and blood platelets.

(*d*) Improve endocrine balance and activation of the ductless glands, particularly the thyroid and the sexual glands.

(*e*) Adjustment of faulty metabolism.

(*f*) Vitamins are activated.

(*g*) Mental stimulation and disappearance of fatigue.

I will now indicate only a few of the commoner ailments or diseases met with in private practice, which can be alleviated and cured by ultra-violet rays treatment alone or in a much quicker space of time when U.V. ray treatment is combined with other remedies.

What is more distressing than an acute attack of Lumbago or Fibrositis? I have very frequently seen this entirely cured after *one or two* treatments.

It is impossible with the space at my disposal to describe the technique for the treatment of the different ailments or diseases described, but in an acute attack of lumbago or acute fibrositis of any region a brisk erythema must be produced. The usual dietetic measures should be enforced and a suitable prescription can be given. But very frequently the patient, relieved after his first or second treatment, does not trouble to have this made up.

The above remarks apply to an acute attack of fibrositis in any part of the body.

Chronic Fibrositis.

It is obviously most important in all cases of Chronic Fibrositis in whatever region, to search for and deal with any septic focus which may be present in teeth, tonsils, nasal accessory sinuses, the alimentary canal, etc.

One cannot expect results unless this is first accomplished, and in addition, toxins circulating in the blood act as a sensitiser and a severe degree of erythema in the skin results.

One may prescribe prescriptions galore without giving the majority of these patients relief, but they can very frequently be cured by a course of eight to twelve treatments. In stubborn cases the intramuscular injection of Contramine every five days will be a most useful adjunct.

Rheumatoid Arthritis.

I have observed that the course of this disease can be stayed and the pain alleviated by a course of treatment which can usefully be combined with injections of an autogenous vaccine if this can be procured.

Neuritis and Sciatica

can very frequently be cured by a course of treatment.

I am convinced that Rheumatism in all its varieties could be prevented if children of a rheumatic diathesis or children manifesting early rheumatic symptoms, such as growing pains, were given a course of ultra-violet radiation as a prophylactic measure. These children have frequently an unstable nervous system and a defective endocrine balance. The nervous system is toned up and the higher centres soothed and the endocrine balance readjusted by the action of these rays.

Whooping Cough.

Almost every drug known has been used for this most distressing and alarming complaint. It is no exaggeration to say that this can be relieved and the "whoop" stopped after five or six treatments, provided the

patient is treated from the commencement of the symptoms. The beneficial results are due to the anti-spasmodic action of the rays. In this connection one would expect good results in convulsions due to teething, in Tetany and Chorea, and this is the case.

Tuberculous Glands

are cured if treatment is commenced early, and provided suppuration has not commenced. An operation for Tuberculous Glands should now be a thing of the past. Local and general treatment is necessary. One would, of course, combine in these cases fresh air, cod liver oil, and malt, calcium and other anti-tubercular remedies. X-ray treatment is a useful adjunct. In obstinate cases a prolonged course of treatment is necessary, and a careful note would be kept of the weight and temperature.

Similar results are obtained in Tubercular Peritonitis and Tuberculosis of joints. Even in joints which have ankylosed free movement may be established. Rollier's classic text-book is well worth the perusal of all, and especially those who are at all sceptical.

The pre-tubercular child can invariably be benefited. Phthisical patients, especially if there is hæmoptysis, should not be treated.

Rickets.

Ultra-violet radiation is a specific for rickets and its sequelæ. Much quicker results are achieved by a course of treatment along with the administration of cod liver oil than by the latter alone.

Neurasthenia.

For no other treatment is the Neurasthenic more grateful. Any septic focus—such as pyorrhœa, intestinal toxæmia, etc.—must be dealt with at the outset. If the patient is the subject of gastroptosis or enteroptosis, a suitable belt must be applied. The treatment can be most usefully combined with intramuscular tonic injections of glycerophosphates or iron or both. There are few treatments more detrimental to the neurasthenic than a rest cure in a home where he has ample time to worry over or magnify his symptoms and the fact that he has given in. It is all important, especially if the patient is a bread-winner, to keep him going, and ultra-violet radiation applied three times a week will invariably improve the patient's outlook from the commencement. Gradually but surely his symptoms of fatigue and anxiety disappear, his power of concentration and appetite return, and life assumes a different aspect.

Alopecia Areta.

Ultra-violet radiation is a specific for this condition, for which in the past innumerable lotions and soaps have been tried with scarcely a measure of success.

Herpes Zoster.

If the patient is seen within the first three days, the pain can be relieved after one or two treatments. The vesicles abort and scab over after about the fifth treatment, and there is no legacy of intercostal neuralgia. These cases, when other forms of treatment are used, drag on week after week, and frequently require hypnotics.

Skin Diseases

Psoriasis rarely appears on parts of the body exposed to the sun. It is to be expected, therefore, that it should yield to ultra-violet radiation, and this is the case. There are few cases that do not clear up if the proper technique is adopted.

Acne Vulgaris and Pustulosa.

Most successful results are obtained, no matter how long the history. The treatment should be combined with dietetic measures and in obstinate cases with an autogenous vaccine. It has been said by one or two authorities on the subject that ultra-violet radiation augments the action of a vaccine if administered at the same time, but I have not noted this. In fact I have combined for the prevention of colds and influenza, a course of ultra-violet radiation and the injection of anti-catarrhal vaccine.

Lupus.

Ultra-violet radiation is a specific (c.f. Finsen's work).

Eczema.

Very good results are obtained, especially in the dry type. The intolerable itching abates owing to the analgesic action on the nerve endings in the skin. Local treatment should in all cases be combined with general treatment.

Tinea Circinata.

Uniformly successful results are obtained. The patches disappear after the second or third treatment and a third degree erythema should be produced.

Chilblains.

Ultra-violet rays are a specific, and can be combined with the internal administration of calcium, or better still, the intramuscular injection of a calcium preparation.

There is nothing in my opinion to equal a course of ultra-violet radiation as a preventative of the diseases of winter, *i.e.*, influenza, bronchitis, etc., and as a tonic during convalescence. To those who are depressed in mind and body, whose metabolism is disordered and whose resisting powers are lowered, no treatment will appeal more or be more beneficial and that solely on its merits. One must bear in mind the improved bactericidal power of the blood, the improved blood chemistry, the analgesic and soothing properties of these rays, the improved endocrine balance and the adjustment of faulty metabolism, all of which are the results from a course of treatment.

Ultra-violet radiation tones up the musculative of the body and also the unstriped muscle. It is therefore most valuable in the incontinence of urine of children, and can be combined with the administration of belladonna. A large percentage of these children are cured.

The child at school who is backward at work and not gaining weight, and who after examination presents no sign of organic disease, will be mentally stimulated, the muscular tone will be improved and a steady gain in weight recorded after a dozen treatments given bi-weekly.

Owing to the bactericidal properties of these rays, the number of organisms in the intestinal canal are lessened and its absorptive powers increased. It is rational, therefore, to obtain good results in cases of intestinal toxæmia, provided focal sepsis and a chronic abdominal lesion have been previously eliminated.

To the pregnant woman a course of treatment is beneficial both to the mother and the fœtus. I have noted in patients treated the rapid convalescence after confinement and the steady but rapid increase of weight in the baby.

In the great number of diseases which can be successfully treated by ultra-violet radiation, an adjunct to accelerate matters will suggest itself.

I have noted above only a few of the ailments and diseases met with in general practice, which do not yield at all or do not yield readily to other forms of treatment.

Space will not permit me to discuss infra-red radiation and the influence of the red rays, but the former are most useful as a preliminary to treatment by ultra-violet rays, since they cause hyperæmia and increased absorption of the ultra-violet rays. Dr. Murray Levick has had excellent results in the treatment of infantile paralysis and muscular wasting by means of the red rays.

Nor do I wish to discuss the merits of the different varieties of lamps, for each has its uses. But I think the general practitioner, who is naturally limited to using one source, will find the Tungsten Arc Lamp, which can also be used as a Carbon Arc or as a Carbon and Tungsten Arc, the most generally useful.

A lamp does not occupy much space in the consulting room, but assuredly that space will have never been so well occupied.

The best method of testing a new lamp is to try it on oneself first for a period at different distances and for different periods of time, before treating one's patients.

Such an addition to the consulting room will not only be a source of great pleasure and gratification to the user and his patients alike, but will be a power of assistance to the general practitioner in his fight for the prevention and cure of disease.

ULTRA-VIOLET RAYS IN GENERAL PRACTICE

BY

W. ANNANDALE TROUP, M.C., M.B., Ch.S. (St. Andrew's).

DR. TROUP has written an excellent text-book, which should certainly be in the medical library of every general practitioner who is practising, or is thinking of practising, Actinotherapy.

After discussing the history, the action of light on living organisms, general consideration and technique, the author gives details from his case notes of conditions treated during the past two years, which will be found a valuable guide to members of the medical profession about to utilise this most beneficial form of treatment.

The book is plainly and concisely written, clearly indexed and contains twelve illustrations.

Copies of this book can be obtained from the Publishing Dept., Ajax Ltd., 117 Central Street, London, E.C.1. Price **4/6.** Post free **5/-.**

FROM A PRESS REPORT

ON THE

FIRST INTERNATIONAL CONFERENCE ON LIGHT

Held at the University, Lausanne, September, 1928.

By Dr. C. W. SALEEBY, M.D., Chairman of the Sunlight League.

AN extra hour's bright sunshine on the top of Hampstead Hill, near London, gave a mean increase in ultra-violet light nearly double, and in blue violet light nearly treble that given by an extra hour's sunshine in London.

Records at Torquay showed clearly the value of the extra dose of ultra-violet light from the sea.

Other records showed the value of vita-glass. Such are the kind of data, as contrasted with ordinary window glass, upon which we must act hereafter in building our houses and cities, and planning our gardens and schools, if posterity is to compete, and compare in efficiency and work, with sunnier lands.

It is much to be regretted that the medical profession of Great Britain has such a small representation on this important occasion, though our need of light is greater than that of any other country.

ULTRA VIOLET IRRADIATION IN BABYHOOD AND CHILDHOOD.

BY

HELEN C. SCOTT, M.R.C.S., L.R.C.P.

THAT gift of the scientific gods, artificial sunlight, seems to have been devised for children even more than for their elders. Youngsters, including babies, respond particularly well and improve particularly quickly under the synthetic rays that are more potent than anything the real sun can give us. And it is cheery work treating these tiny ones. At first they hate it; it is cold and embarrassing to be undressed in a strange place; but after the first dose or two every morning the mother gets "Is it the day to go to my sun doctor?"

The short wave lengths in the radiation of the mercury vapour lamp are specially beneficial to children, and there are a great many childish conditions which have no better remedy. Carbon and tungsten arcs have their good uses too, but act less quickly and surely than mercury vapour in specific conditions such as rickets and tuberculosis. To counteract bad surroundings, town life with overcrowding and too little air and sunlight, wrong diet and malnutrition, exposure to infection, the carbon arc has been found extremely valuable; but a good deal more research will have to be done before we are sure of the best lamp to use for a given condition.

Much has been said and written, especially since the war, about rickets, which is a dramatic disease capable of dramatic cure. The lately-discovered vitamin, antirachitic D, has been given the responsibility of preventing and curing rickets by enabling the organism to utilise whatever calcium comes its way. Vitamin D is manufactured by ultra-violet light, and can be quickly and certainly stored in orange juice, in milk and other substances, and in the human body by irradiation. A ricketty child should be exposed to the mercury vapour lamp three times a week for one minute, increasing to 10 minutes, at a distance of two and a half feet. The treatment should continue for three to six months, and the cure can be checked by a periodic X-ray photograph of the bones. It will be seen that calcium is being laid down, and woolly epiphyses become clear. Bent legs straighten out, flabby muscles become firm, and the peevish child who falls down when he tries to run, and cries when he is touched, becomes steady on his feet, good tempered and contented; he cuts his teeth more happily, and they are better teeth.

Spasmophilia is a distressing syndrome, often associated with rickets and traceable to faulty calcium and phosphorus metabolism. After one or two irradiations the convulsions stop permanently; but treatment should go on for a number of weeks. The serum calcium content, always low in these cases, soon returns to the normal 10 mg. in 100 c.c. All marasmic infants should be irradiated, and they should have at the same time a very skilfully regulated diet. The little corpse-like creature with its old-man face is a live laughing human baby after two weeks' daily exposures of half a minute, increasing to five minutes. The child who is debilitated from any cause, the child who does not get on,

gaining no weight or even losing weight, the so-called pre-tubercular child, all do well with tungsten arc exposures of two to fifteen minutes. Progress should be checked by regular weighing, weekly or two-weekly, according to the age of the child. Every child suffering from enuresis should be given a chance with ultra-violet radiation, which has cured many cases, especially the nervous, bad-tempered type, fretful and troublesome, suffering from night terrors. After two or three treatments the enuresis generally stops, and if the course continues the patient becomes a normal happy being. The child who is convalescing from any illness, more particularly broncho-pneumonia and the specific fevers, should be irradiated on alternate days to hasten the return to health. For treating children in bed at their own homes, the portable carbon arc lamps are admirable.

Mercury vapour exposures are best for catarrhal and "chesty" children. Of course tonsils and adenoids must be looked after first. Most enlarged tonsils may be satisfactorily dealt with by means of quartz applicators, used very patiently and carefully, thus avoiding the often life-long fear complex caused by an operation. Exposures of the whole body will prevent the tendency to catch cold, and it is easy to combine the irradiation with deep breathing practice and instructions about the proper way to breathe. Deep breathing can readily become a game, especially if several small patients are treated together.

Most tubercular manifestations do well under ultra-violet rays. Dramatic success has attended irradiation of joint lesions and glandular tuberculosis. In phthisis the results have been good, but the treatment must be very carefully given by an expert or harm may be done, for not all cases respond well. There has been little success with miliary tuberculosis.

Wounds heal more quickly if irradiated. The bactericidal effect of U.V.R. is of the greatest value in the treatment of a septic wound. Oral sepsis must be dealt with by means of special applicators. A great many obstinate skin conditions can be finally cured by irradiation, notably ringworm, which is best treated by local application of the water-cooled lamp. Six or eight doses are often sufficient. The falling out of the hair after fevers should be treated by daily exposures of the scalp at a distance of 10 inches. Chilblains can be very rapidly cured by systematic treatment, the rays acting both locally and constitutionally. The child should have local exposures of the chilblains and general exposures of the whole body three times a week. After three or four doses the chilblains will have disappeared; but the treatment should be kept up for a month or two. It should be seen too that plenty of calcium is taken by the mouth, either in the form of large quantities of milk, or one of the many calcium preparations on the market.

There are certain important counter-indications to ultra-violet ray treatment. A few children—about one in 400—are "light sensitive," and cannot be treated by this method without grave harm. But after the first dose this idiosyncrasy is apparent in malaise, fretfulness, sore skin, occasionally rise in temperature, and the dose is of course not repeated. A child with cardiac disease requiring rest in bed should not have U.V.R. The treatment is considered harmful also in nephritis and diabetes; the scientific reason for this is not clear, but will doubtless be elucidated with further research.

It is a mistake that erythema should be aimed at with every dose of light. It is also a mistake that the erythema dose for a child is smaller than that for an adult; it is actually double or more than double. But

a general exposure should not result in erythema, and the doses should not be pushed to procure a great deal of tanning which, while pleasing the parents, prevents subsequent sun baths from having the appropriate effect. One minute at a distance of 30 inches, slowly increasing to 10 minutes, is suitable for general exposure of a child of eight years to a mercury vapour lamp, whose output has not appreciably diminished. The smaller the child, the shorter the exposure, of course. Exposures to the carbon and tungsten lamps are considerably longer. Local doses are longer and at closer range. The operator must use his common sense and experience to vary the dose according to the condition he is treating. His results will be good according to his skill and patience, and in time the Ministry of Health will be persuaded that innumerable sunlight clinics are necessary to the health of the children, for whom in other directions it has so much care.

THE USE OF QUARTZ APPLICATORS

BY

ERNEST F. C. DOWDING, M.R.C.S.Eng., L.R.C.P.Lond.

THE literature on quartz applicator work up to the present has been rather sparse; so that it has been left to the individual actino-therapist to find out things for himself.

The length of exposure, the distance of applicator from the seat of lesion, etc.

For cavity work the difficulty with the Mercury Vapour Lamp has been the rigidity or semi-rigidity of attachment of applicator to hood, so that one had, as it were, to bring the patient in contact with the lamp instead of the lamp to the patient.

This can be overcome by means of flexible burnished metal tubing with bayonet joint at lamp and applicator attachment.

With such attachment I have been able to treat cases with quartz applicator in comfort and ease both to myself and patient.

The exposures necessary are, of course, longer. I have found four to six minutes in this way in direct contact not excessive.

FOR EXAMPLE—

Such cases as follicular tonsillitis, otitis media, with free tympanic drainage, ozœna, and acne of external auditory meatus do exceedingly well with direct quartz application.

In two cases lately I have found great benefit to the patients (both of whom refused operations) by direct application to uretheal caruncle.

The irritation, pain and frequency of micturition was most certainly greatly relieved after 15 applications, and patients gained strength owing to less disturbed nights.

In my opinion, as I think other workers in this branch will agree, there is a wide field open as time advances for quartz applicator work which will make the science more technical still, and which is just as important, convey to the general public that it is a treatment to be applied scientifically by a qualified medical man and not as at present to be administered by everybody and anybody exclusive of previous experience and qualifications.

THE USE OF VITAGLASS IN ACTINOTHERAPY

IT is generally agreed by the medical profession that apparatus generating a powerful volume of ultra-violet rays should not be used indiscriminately by members of the public.

With the help of Vitaglass, however, a glass capable of transmitting ultra-violet light down to a wave length of 2,900 Ångstrom Units, and invented by Mr. F. F. Lamplough, M.A., of Birmingham, low power ultra-violet ray generators can be used by the normally healthy person for general tonic effects and no more harm can result than from exposure to natural sunshine.

Vitaglass is now being used fairly extensively in sanatoria, institutions, schools, hospitals, etc., and even private houses to the vast benefit of the occupants and we think it is safe to say that the day is not far off when all our houses will be fitted with windows glazed with this type of glass.

The following extracts will undoubtedly prove of interest:

"The rays shorter than about 2,500 A.U. do not, therefore, interest us as far as the skin is concerned. One hears talk of artificial sources having short rays which are not present in the sunshine, and may be dangerous, but rays shorter than 2,500 A.U. do not penertate and, as I say, do not influence us.

The ultra-violet rays of the sun come through Vitaglass very well, but not so the shorter rays from artificial sources. If you wish to make an artificial source like the sun, put on a Vitaglass screen; in that way it is possible to cut down the power of the lamps and render them like sunshine and you will not be burned, as otherwise you might. For domestic use, lamps so screened are advantageous. I do not think it matters if healthy people do burn themselves with ultra-violet rays, they will not do themselves any material harm."

LEONARD HILL, M.B., F.R.S.,
"British Journal of Actinotherapy," Feb., 1928.

"As to those who used lamps at home because they felt the necessity of light, the lamps most suitable for such use were those which most nearly approached to the sun's rays—lamps which did not emit anything shorter than 2,970 Ångstrom Units. No danger was likely to result from the use of such lamps and he personally did not hesitate to order them for patients. The use by patients of naked quartz lamps was inadvisable and much to be regretted."

ALBERT EIDINOW, M.B., B.S., L.R.C.S., L.R.C.P.,
"British Journal of Actinotherapy," Mar., 1928.

GENERALISATIONS

BEFORE passing to the classified list of troubles suitable for "Sunlight" Treatment, we may spare a few lines for generalisations.

Constitutionally, such troubles as Rickets and Tuberculosis stand out so pre-eminently as to dwarf other utilities, but Anæmias, Congestion, and their sequelæ, are a natural field for "Sunlight." The metabolic action of "Sunlight" makes it a valuable force, both as a preventive (*e.g.*, building up body resistance) and as a restorative after debilitating illnesses (*e.g.*, influenza).

As might be expected, its dermatological uses are manifold. Eczema, Lupus, Alopecia, Ringworm, Psoriasis, Nævi, Herpes, Impetigo, Chilblains, Pruritus and Ulcers are but a few of the skin disorders which clear up under "Sunlight" more readily than by any other means.

Artificial Sunlight is a most potent bactericidal and germicidal agent, and to this it owes much of its value. Too much emphasis can hardly be laid upon these effects, for they operate either as primary or secondary manifestations in an enormous proportion of the cases met with in daily practice. Many of these cases cannot adequately be reached by the usual germicidal and bactericidal agents; consequently the field for Artificial Sunlight is immense, and far too great to be scheduled. Wherever toxins exist, or infection has taken hold, irradiation can be used to stultify and neutralise it.

Varicose Veins, Hay Fever, Pyorrhœa, and Spinal Caries, in all of which very great success has been recorded, merely serve by their differences of origin and incidence to show how very wide is the field in which "Sunlight" exhibits its powers.

Those who have the best ability to judge, are inclined to the view that Artificial Sunlight, properly utilised, is the greatest curative agent that has been placed in the hands of the medical profession for a couple of centuries.

MEDICAL OPINIONS

REPRINTED from *The Quartz Mercury Vapour Lamp*, by Dr. J. Bell Ferguson, M.D. Chap. VI., pp. 58-74.

Rheumatic Diseases.—Any busy practitioner will agree that he is occupied to a large extent with a huge group of what may be termed rheumatic diseases. Indeed, it has been shown that one-sixth of the industrial invalidity of this country is due to "rheumatism." Such conditions as sciatica, neuritis of various forms, lumbago, muscular rheumatism, fibrositis in adults, and chorea, nervous fidgety states and subcutaneous nodes in children, yield decidedly and often with astonishing rapidity to ultra-violet radiation properly administered. Indeed, one may almost predict that after a short experience of radiation treatment in these cases, the exhibition of the usual drugs will take a second place.

Respiratory Diseases.—Bronchitis, nasal catarrh, repeated "colds,"

and debilitated states form another large group of cases. Here results with ultra-violet radiation are not so consistent as in the preceding group of "rheumatic" diseases, but a course of a dozen or so "light-baths" often does much to raise the patient's resistance, especially in young persons and children suffering from what is conveniently termed general debility. As a rule, bi-weekly exposures back and front of three minutes at three feet are sufficient, increasing to five or six minutes. In the case of patients subject to repeated "colds," it is wise to commence with a smaller dose, for sometimes the catarrh is made worse. These patients are usually found to possess a low blood pressure. The depression and malaise met with after febricula and influenza yield rapidly to irradiation, but dosage in these cases must be very gradual, and the rule is to avoid any erythema reaction in the initial doses. Later, small areas about nine inches square may be irradiated more strongly, and a first degree erythema produced.

Skin Diseases.—In this field the general practitioner will find most encouraging and often surprising results. Many cases of chronic nature, which have resisted all kinds of treatment, in hospital and otherwise, will be found to improve rapidly and to clear up under ultra-violet radiation. In the matter of dosage, moist eruptions should have stronger initial doses than dry eruptions, and as the skin heals the dose may be somewhat reduced, or the intervals between treatments lengthened. As a rule, applications should be given every second day to the lesions, with general irradiation of mild degree to the whole body once or twice a week.

Good results have been obtained by the writer in cases of septic dermatitis, acne, eczema of the face, scalp, ears, and body, lupus and scrofuloderma, xerodemia, psoriasis, food rashes of a chronic and baffling nature, burns, impetigo, chicken-pox, herpes zoster, and some forms of trade or occupational dermatitis.

The practitioner will readily extend this list, and in cases of doubt treatment of a localised area through a window in tissue-paper will soon indicate whether ultra-violet radiation is likely to be of benefit or not.

In connection with certain of the above conditions, the writer has found a marked tolerance to ultra-violet radiation and lack of response on the part of the skin itself. This has been chiefly noticed in connection with psoriasis and xerodermia, or in patients with dry, scaly skins.

In several instances where improvement was tardy or absent, immediate benefit resulted by using cosin or erythrosin as a "light sensitiser." Painting on solutions of eosin gave no appreciable result, but success followed feeding with tablets containing 1½ gr. eosin. One tablet was given three times a day in a spoonful of jam for fourteen days, followed by fourteen days' rest, and so on. It is necessary to warn the patient that the urine and fæces will become red. No harm was seen to result in any case, and the method is well worth a trial.

Psoriasis limited to arms and legs responds well to ultra-violet radiation. Such cases would probably benefit from a combined course of ultra-violet radiation and X-rays.

In herpes zoster, if the case can be irradiated at the onset of the attack, the disease may be apparently aborted. In any case, the relief obtained from pain and the extreme skin sensitiveness often met with is most pleasing to the patient.

About five minutes at one foot over the affected area with the open lamp and a slightly less exposure over the dorsal spines involved are indicated.

Cases of acne vulgaris respond in a most satisfactory manner. On the face, second or third degree reactions are usually required, but the second case quoted later on with severe acne of the chest and back responded in the most remarkable way to mild irradiation without the production of any uncomfortable reaction.

General Tonic Effect of Ultra-Violet Radiation.—As a tonic in convalescents generally there is a very wide field for use in general practice of the quartz mercury vapour lamp for its tonic effects, particularly in convalescence after debilitating diseases—pneumonia, bronchitis, influenza, whooping cough, infectious diseases, "run-down" conditions, and a host of other common ailments.

In such cases, initial doses of three minutes at three feet to the chest and back, repeated two or three times a week, and increasing gradually by one or two minutes a week at the same distance, usually prove satisfactory. In cases where the blood pressure is likely to be low, the initial dose should be one minute at four feet to the chest and back.

Extract from *Ultra-Violet Radiation*, by Drs. E. H. and W. K. Russell, M.D.'s.

Conditions in which Ultra-Violet Radiation Has Been Used.—When selecting cases for ultra-violet radiation the biological effects of the rays must be borne in mind. It must be remembered that the rays are absorbed by the blood, and thus carried throughout the whole of the system. The chief general effect is an increase in the rate of metabolism, the appetite is stimulated, and the whole resistance of the body is raised; hence the value of this treatment after acute illnesses and in weakly children and adults. The number of micro-organisms in the intestinal tract is reduced, absorption is facilitated and catarrh is lessened. The tone of unstriped muscle is increased, and obstinate cases of constipation and auto-intoxication from the bowel are greatly benefited. Anæmias are aided by stimulation of the hæmopoietic system, and increase in hæmo-globin; rickets from the increase of calcium and phosphorus in the blood; and surgical tuberculosis and many infections by the increase of the bactericidal power of the blood, lymphocytosis, and increase of general resistance. Lorand considers ultra-violet radiation valuable for its rejuvenating properties, the reason for these being, in his opinion, due to stimulation of the endocrine glands, especially the thyroid and sexual glands. Similarly many other conditions can be thought of which might be benefited by ultra-violet radiation when one considers its physiological properties.

A search through the scattered literature on the subject has been made, and a list, of very considerable length, of the conditions which have been treated by ultra-violet radiation has been compiled. As might be expected in the case of a new mode of therapy, this list is a very long one, as it is only by treating various conditions that its value, if any, in particular cases can be estimated.

Good results have been claimed in the following diseases by various observers :—

Dermatological Cases.

Abscesses
Acanthosis nigricans
Acne vulgaris
Actinomycosis
Alopecia
Angioma serpigiosum
Barber's itch
Boils, furunculosis, carbuncles
Burns
Chancroid
Cloasma
Dermatitis venenata
Eczema, acute and chronic
Erysipelas
Frostbite
Folliculitis barbæ
Granulating wounds
Hæmatomata
Herpes
Ichthyosis
Impetigo
Intertrigo
Keloid
Leishman's sore
Leucoderma
Leucoplakia
Lichen planus
Lupus erythematosis
Lupus vulgaris
Nævus
Onychia
Pernio
Phagadena
Pityriasis
Pruritus
Psoriasis
Rhinophyma
Rosacea
Sceleroderma
Seborrhœa
Telangiectasis
Tinea
Ulcers, acute and chronic
Urticaria
Xanthelasma palpebrale
X-ray dermatitis

Alimentary System.

Congestion and cirrhosis of the liver
Constipation
Gastric or duodenal ulcer
Gastritis
Hæmorrhoids
Hyper-acidity
Mesenteric glands, tubercular
Obesity

Circulatory System.

Anæmias
Angio-neurotic œdema
Angina pectoris
Atheroma
Chilblains
Hyperpiesis
Myocarditis
Nervous heart affections
Raynaud's disease

Genito-Urinary System.

Amenorrhœa
Dysmenorrhœa
Erosion of cervix uteri
Fistula
Gonorrhœa
Leucorrhœa
Menorrhagia
Metritis
Metrorrhagia
Nervous affections of the menopause
Nephritis
Ovaritis
Prostatitis
Pruritus vulvæ

Respiratory System.

Bronchial asthma and catarrh
Common colds
Phthisis
Pleural adhesions (non-tubercular)
Spasm of glottis
Whooping cough

Nervous System.

Anterior poliomyelitis
Hysteria
Insomnia
Neurasthenia
Neuritis
Sciatica
Locomotor Ataxia
Melancholia
Myelitis
Nervous debility
Neuralgia
Spasmodic croup
Teething convulsions in children
Tetanic fits

Special Senses.

Ear—
Middle ear deafness
Purulent discharge from ear
Hay fever
Hypertrophied turbinate bones
Eye—
Iritis
Opacities of cornea
Trachoma
Tubercular conjunctivitis
Ulceration of cornea
Nose—
Atrophic rhinitis
Ozœna
Sinus infection
Throat—
Laryngitis
Pharyngitis
Pyorrhœa
Tonsillitis

Miscellaneous.

Carcinoma of breast
Chronic infections
Chronic headaches with vomiting
Chronic auto-intoxication
Chorea
Debility
Diabetes mellitus
Fibrositis (including lumbago)
Gout
Marasmus
Mumps
Osteomalacia
Osteomyelitis
Pleurodynia
Rheumatism, articular and muscular
Rodent ulcer
Scabies
Scurvy
Surgical tuberculosis
Syphilis
Teno-synovitis
Trench feet
Torticollis

AUTHORITATIVE VIEWS ON "SUNLIGHT" TREATMENT
(ULTRA-VIOLET IRRADIATION).

"Actinotherapy is in a state of evolution. New sources of artificial sunlight are being invented and old ones improved. New uses for this form of therapy are being found every day. The field of its application is being widened and broadened until one is amazed at the possibilities before him, and to-day I feel its adoption by the profession at large is not in the dim and distant future, but that now is the appointed time."

"Neurasthenia. There is no disease in which greater benefit may be derived from Ultra-Violet Radiation than this."

"Lumbago and other forms of Fibrositis. If Gower's theory be correct that lumbago and presumably other forms of fibrositis are due to inflammation of the fibrous tissue with which different nerve endings are surrounded, then it is easy of comprehension why the erythema produced by Ultra-Violet energy should successfully combat the pains of fibrositis."

"Rickets. This is one of the diseases most amenable to Ultra-Violet energy in which the therapeutic value of this energy has been proved beyond doubt."

"Hay Fever. Diseases of the Nose. Results obtained by using Ultra-Violet Radiation in this condition prove more satisfactory than those obtained by any other method."

"Tuberculosis. It seems imperative in all forms of Tuberculosis to which Ultra-Violet Radiation is applied, to administer both general and local irradiation, though the general irradiation must be regarded as the most important."

". . . . . **Cases of Potts Disease,** tubercular hip joint, with discharging sinuses, begin to improve even after years of illness, even after the first or second treatment, and when this takes place, progress is rapid."

"That there are many other conditions and diseases in which benefit can be obtained from Ultra-Violet Therapy is obvious from what has already been said. This has repeatedly been proved in general diseases such as **anæmia, sclerosis,** local conditions such as **old wounds** and **indolent ulcers."**

Dr. F. Howard Humphris, M.D.

"The power of Ultra-Violet Rays to cure **surgical tuberculosis and rickets,** to hasten the cure of wounds and to improve the general health of weakly children has been abundantly established."

Prof. Leonard Hill, M.B.

"In the present state of our knowledge Ultra-Violet Rays are both the most important and the most interesting of those existing in the solar spectrum. Their direct bactericidal action has long been well known, but of greater importance and of fascinating interest is their effect on deep-seated and inaccessible regions to which they are capable of penetrating."

"In this action the recent work of Prof. Leonard Hill in collaboration with Dr. Colebrooke and Dr. Eidinow is valuable and noteworthy. These investigators demonstrate that via the skin or other tissues, Ultra-Violet Radiation possesses the power of greatly enhancing the bactericidal power of the blood; a discovery of the highest interest and importance."

Sir H. J. Gauvain, M.A., M.D.

"In premature loss of hair remarkably successful results are obtained after a few exposures. The treatment may be considered the method *par excellence* in **Alopecia."**

"**Chronic Fibrositis** with or without the accompanying **Neuritis** can be relieved and even cured by a series of exposures spread over a few weeks. Cases of chronic articular **Rheumatism,** especially in knee and shoulder joints, are benefited often in a remarkable manner. **Neuritis** can frequently be relieved and cured by irradiation of the parts overlying the nerve. Many forms of **Arthritis,** both acute and chronic, rheumatoid, osteo and gonorrheal, can be remedied and a fair proportion cured."

"Ultra-Violet Radiation is of great benefit in a variety of depressed states of health, both physical and mental. The effect of a brief exposure is that of stimulation and a sense of well-being. Most of the numerous cases of **Nervous Debility**—so common in our large cities, especially after a long dull winter with the maximum of sunless days—can be restored to health by a very few exposures of Ultra-Violet Rays."

"**Cases of Tuberculosis, Peritonitis and Tubercular or Mesenteric glands** in children do very well treated by Ultra-Violet Radiation. **Infantile rickets** can be most successfully treated."

Dr. Percy Hall.

"**Eczema.** Ultra-Violet Radiation proves a very valuable therapeutic agent in this very common condition, both in its acute and chronic forms."

"**Bone and Joint Lesions.** The effects of heliotherapy in this type of disease are marvellous."

"**Rickets.** Ultra-Violet Radiation may be safely regarded as a specific remedy for this disease."

"Ultra-Violet Radiation has proved particularly useful in cases of **hyper-acidity, chronic gastritis and duodenal and gastric ulcers.**"

"**Common colds** can be satisfactorily treated by Ultra-Violet Radiation. Most successful results have been obtained in cases of **Asthma.**"

"**Chronic Bronchitis** cases do well as do cases of **Laryngitis.**"

"We have had opportunity of treating a large number of cases of **whooping cough** by means of Ultra-Violet Radiation, and the results have been uniformly successful."

"**Chorea cases** do well with general irradiation."

"**Neurasthenia.** These cases do remarkably well with Ultra-Violet Radiation."

"Ultra-Violet Radiation is helpful in treating the paralysis which often follows an attack of **Anterior Polio Myelitis.**"

Dr. E. H. Russell, M.D.
and Dr. W. K. Russell, M.D.

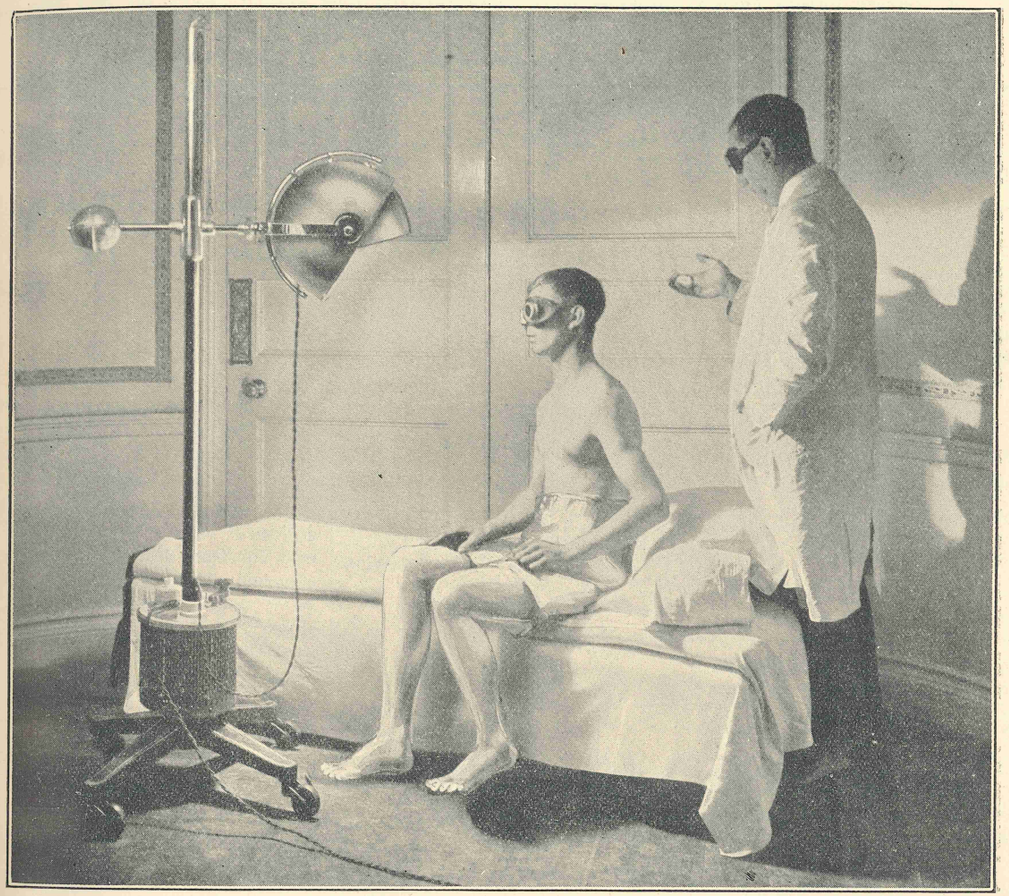
In a lecture given at the Middlesex Hospital and reprinted herewith from *Modern Sunlight*, Dr. Percy Hall mentioned the beneficial effects which had been obtained from Ultra-violet rays in cases of tuberculosis and rickets, and added that diseases of bones and joints, tuberculous in origin, which usually resulted in patients losing their limbs, could now be quickly cured by this method. Diseases of the nervous system, some of which were definitely organic, could be helped—he did not say they could be cured, but very striking results could be obtained. Children with infantile paralysis he had seen had been speedily treated with success. Functional diseases benefited in an extraordinary manner, and the whole range of skin diseases, with few exceptions, could be benefited and even cured. Rheumatism he had seen cured with complete restoration of function. They were ever widening their field in discovering different groups of diseases which could be benefited by this method. It was not a method which was going to supersede all other methods—it was not a cure-all—but one by which astonishingly good results were obtained, sometimes absolutely dramatic results obtained. Interest was growing to such an extent that hospitals up and down the country were putting in equipments, and beginning to treat their patients, and on every hand one got excellent results. In conclusion, the lecturer said, "No doubt this is a method which has come to stay."

Our thanks are tendered to those authorities whose dicta and formulæ have been drawn upon for the information contained in these pages.

We pass it on, in the hope that workers will find herein both help and assistance.

AJAX "SUNLIGHT" APPARATUS IN USE.

STAND MODEL ADJUSTED TO EMIT ULTRA-VIOLET RAYS AT AN ANGLE OF ABOUT 45°.



The case under treatment is one of Asthma and Bronchitis, the initial treatment being of two minutes duration at two-and-a-half feet distance. Although primarily the exposure was a local one, it will be noticed that the whole body is being irradiated, thereby adding very considerably to the efficacy of the treatment.

With exposures of this sort, the two hoods, being mobile, can be fixed in any desired position, thereby directing the rays on any given spot. The lamp is also instantly adjustable to any height.

Ajax Goggles are being used, and the operator, it will be noticed, is accurately timing the exposure by means of an "Ajax" Chronometer Timing Recorder.

"SUNLIGHT" TREATMENT (Ultra-Violet Irradiation).

Tabulated List of Maladies, manner of Treatment and Prognosis.

Data here given are based upon actual practice by Specialists in Actino-Therapy with wide experience of technique in the use of the "Ajax" Quartz Burner Mercury Vapour Lamp.

The suggestions given can be modified and varied as may be indicated by the patient's condition, the Doctor's clinical notes or other factors and furthermore, when given in conjunction with other Medical or Surgical treatment, quicker and better results are sometimes obtained.

A Mercury Vapour Quartz Burner is much more powerful than normal during the first few hours of its use and precautions must be taken against over exposure.

Instructions for use of Carbon and Tungsten Arc Lamps are given on pages 63, 64 and 65.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
ABSCESS	Expose parts	10ins.	1 min.	½ min.	4 mins.	Daily	The organisms can be killed by irradiation, about 4 to 12 treatments being usually necessary.
ACNE (Rosacea or Vulgaris)	Prone (local) Prone (whole body)	8ins. 3ft.	1 min. 10 mins.	½ min. 2 mins.	3 mins. 25 mins.	Twice weekly Weekly	Secure active hyperæmia. About 6 local or 12 whole body treatments are usual to complete cure.
ALOPECIA AREATA	Sitting	12ins.	5 mins.	1½ mins.	15 mins.	Twice weekly	Stimulate follicles by chemical action of rays. Comb hair into furrows, letting rays play successively on each furrow for 20 seconds. Sometimes a single treatment starts hair growth: generally a dozen or so treatments suffice.
AMENORRHŒA	Lying on back	24ins.	2 mins.	½ min.	4 mins.	Daily	Irradiate lower abdomen; menses return to normal after half a dozen treatments.
ANÆMIA	Prone	3ft.	3 mins.	1 min.	20 mins.	Alt. days.	The rays promote absorption of iron and increase red corpuscles. About 10 treatments.
ARTHRITIS, RHEUMATOID	Expose whole body, prone	3ft.	2 mins.	1 min.	12 mins.	Alt. days	Irradiation increases the bactericidal power of the blood from first session: according to case, from 10 to 100 treatments needed.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
ASTHMA	Chest and back	3ft.	1 min.	½ min.	4 mins.	Daily	Expose large areas regularly. Prompt relief is noticed, from 6 to 20 treatments complete cure.
ATROPHIC RHINITIS	Lying on back	Join patient and lamp with rod	2 mins.	¼ min.	3½ mins.	Alt. days	Treat with quartz rods and let patient inhale ozone from lamp before starting treatment—the nitrous oxide is helpful. From three to twenty treatments usually suffices.
BOILS	Expose parts	12ins.	1 min.	½ min.	4 mins.	Daily	If possible, treat before pus formation and abort the boil at first treatment. Otherwise about ten treatments (after incision of boil) are needed.
BONE CALCIFICATION	Expose whole body	3ft.	2 mins.	1 min.	10 mins.	Alt. days	The rays markedly accelerate bone calcification; a course of from a dozen to twenty treatments should be given.
BLINDNESS							Investigations at a London Hospital show splendid results, but special technique, not yet available for publication, is needed, and workers should act with great circumspection pending fuller details, the conjunctiva reacting quickly and painfully to ordinary irradiation.
BLOOD PRESSURE, HIGH	Expose local areas	2ft. 6in.	2 mins.	½ min.	4 mins.	Treat daily small areas in succession	Localised treatment diminishes pressure and gives a feeling of rest and freshness, with absence of insomnia and headaches. From three to twenty treatments or more if intervals are allowed between treatments.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
BRONCHITIS	Expose chest and back	2ft.	2 mins.	½ min.	4 mins.	Alt. days	Chronic cases do well, the prognosis being highly favourable. A course of about twenty treatments is usual.
BRONCHO-PNEUMONIA	Expose chest and back	2ft.	2 mins.	½ min.	4 mins.	Daily	Irradiation is an ideal prophylactic, the sessions being governed by clinical data.
CALCIFICATION, BONY	Expose whole body	3ft.	2 mins.	1 min.	10 mins.	Alt. days	Accelerated by rays. A dozen to twenty treatments is best.
CARBUNCLES	Expose parts only	18in.	3 mins.	2 mins.	12 mins.	Alt. days	Respond splendidly, pain relieved, absence of scars. From five to fifteen treatments.
CATARRH, NASAL	Expose chest and back	2ft.	2 mins.	½ min.	5 mins.	Alt. days	Improvement from first treatment. Usually a dozen treatments are given.
CHILBLAINS	Expose part	6ins.	1 min.	½ min.	4 mins.	Alt. days	The rays cure quickly by vaso-motor and trophic effects. From two to twenty treatments.
CHLOROSIS	Expose whole body, prone	3ft.	3 mins.	1 min.	20 mins.	Alt. days	Absorption of iron is promoted and increase of red corpuscles and hæmoglobin. From ten to fifty treatments.
CHOLECYSTITIS	Expose whole body, prone	3ft.	3 mins.	1 min.	10 mins.	Daily	Irradiation lessens the blood in the portal system. Give half a dozen treatments, and if needed, a further eight or ten.
CIRRHOSIS	Expose whole body	3ft.	3 mins.	1 min.	10 mins.	Daily	Rays act as in Cholecystitis. From twenty to forty treatments usually necessary.
COLONITIS	Expose whole abdo-men	3ft.	2 mins.	1 min.	12 mins.	Daily	Bactericidal action of rays, and increased bactericidal power of blood, destroys toxic organisms. Ten to thirty treatments.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
CONVULSIONS	Expose whole body	4ft.	4 mins.	1 min.	10 mins.	Daily	Trouble responds well, sometimes one treatment suffices to check it, but half a dozen at least are advisable.
CORNEAL ULCERS	Rod in contact with ulcer		1 min.	¼ min.	3 mins.	Alt. days	Treat with quartz rod, cover surrounding area. Two to ten treatments.
CYSTITIS	Expose lower abdo-men	2ft.	2 mins.	½ min.	8 mins.	Alt. days.	Give general irradiation, supplemented by local treatment per rectum or vagina. From two to ten treatments checks, but about twenty should be given.
DERMATITIS, VENENATA	Expose parts	2ft.	1½ mins.	½ min.	4 mins.	Daily	Frequently due to a fur collar. Two or three treatments to neck will usually suffice.
DIABETES, MELLITUS	Expose whole body	6ft.	2 mins.	¼ min.	6 mins.	Twice weekly	Dr. Rollier uses irradiation, but other workers find difficulties. We recommend caution.
DIAPEDESIS							This is a normal sequel of irradiation—the phase between exposure and pigmentation. Only when exudation is followed by blistering is treatment called for. The use of Leucodescent lamp will diminish Diapedesis when desired.
DIARRHŒA	Expose whole abdo-men	2½ft.	2 mins.	1 min.	8 mins.	Daily	As in Colonitis, the bactericidal effect of the rays disinfects the bowels and promptly checks the trouble. Treat daily for five to fifteen days: then once weekly for three or four weeks.
DIPHTHERIA	Expose whole body	2ft.	2 mins.	1 min.	8 mins.	Daily	Use water-cooled lamp, or air-cooled as prophylactic. Ten to thirty treatments.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
DUODENAL ULCERS	Expose abdomen	2½ft.	2 mins.	½ min.	5 mins.	Alt. days	Even cases beyond the reach of the rays are much helped by irradiation. Treat for several weeks.
DYSMENORRHŒA	Expose whole body, prone	3ft.	3 mins.	1 min.	12 mins.	Twice weekly	Combine irradiation with Diathermy if desired. Give treatment for three months.
DYSPEPSIA	Expose whole trunk	3ft.	2 mins.	1 min.	8 mins.	Alt. days	Acidity, gastritis and pains relieved from first treatment. A course of twenty or more treatments should be given.
ECLAMPSIA	Expose whole body	4ft.	4 mins.	1 min.	10 mins.	Daily	Though immediate relief may be experienced from the first treatment, a course of fifty or more should be given.
ECZEMA	Expose parts	6ins.	5 mins.	1 min.	15 mins.	Alt. days	Use water-cooled lamp for preference, and give treatment for four or five weeks. Both acute and chronic forms respond well.
ERYSIPELAS	Expose parts	12in.	2 mins.	½ min.	6 mins.	Daily	Relief from first or second application may be expected. Treat for not less than one month.
FACIAL PALSY	Expose face and neck	2ft.	1 min.	½ min.	4 mins.	Twice weekly	Much relief from irradiation. Patients should continue treatment for six months.
FATIGUE	Expose whole body, prone	3ft.	3 mins.	1 min.	12 mins.	Alt. days	Improved metabolism and circulation following on irradiation particularly effective in fatigue and toxæmia from fatigue products. Treat until all symptoms have gone and the whole tone is normal.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
FIBROSITIS	Expose whole trunk	2½ft.	2 mins.	1 min.	6 mins.	Alt. days	Give about forty treatments. Immediate relief will follow irradiation, but steady applications are called for.
FURUNCULOSIS	Expose parts	12in.	1 min.	½ min.	4 mins.	Daily	Use irradiation as prophylactic or to abort. The initial treatments will bring improvement, but the course should last a month.
GASTRIC ULCERS	Expose stomach	2½ft.	2 mins.	½ min.	5 mins.	Twice weekly	Improvement even when beyond reach of rays. Give fifteen to thirty treatments.
HÆMORRHOIDS	Patient kneeling, holding buttocks apart	Lamp in contact with patient through quartz rod or speculum	2 mins.	1 min.	4 mins.	Repeat when reaction cleared	Use quartz applicator or rectal speculum. Continue treatments until normality is restored.
HAY FEVER	Patient lying on back	Lamp and applicator in contact with area treated	2 mins.	½ min.	4 mins.	Daily	Water-cooled lamp is preferable, with quartz applicator to nasal passages. Sometimes a cure is obtained in a couple of treatments.
HEART, VALVULAR DISEASE OF	Expose whole body, prone	3ft.	2 mins.	1 min.	10 mins.	Twice weekly	Highly effective; patients lose languid feelings, eat and sleep well. Treat for three months.
HERPES, ZOSTER, FACIALITIS & GENITALIS	Expose parts	2½ft.	3 mins.	1 min.	12 mins.	Alt. days	Pain often gone after first application. Give not less than twenty treatments.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
HYPOTHYROIDISM	Expose thyroid area	2½ft.	1½ min.	1 min.	6 mins.	Twice weekly	Iodine content of thyroid improved by rays. Striking results from six or seven weeks' treatment.
HYSTERIA	Expose whole body, prone	3ft.	2½ mins.	1 min.	10 mins.	Alt. days.	Rays check calcium excretions and so diminish nervous irritability. Treat for two weeks or more.
IMPETIGO	Expose parts; remove crusts	2ft.	4 mins.	1 min.	8 mins.	Twice weekly	Bactericidal effects of rays and increased blood and lymph yield splendid results. Treat for two months.
LARYNGITIS	Patient lying	Applicator in contact	3 mins.	1 min.	5 mins.	Daily	Irradiate after cleaning passages, using water-cooled lamp with quartz applicator or speculum. Give ten to thirty treatments.
LEUCÆMIA	Expose whole body, prone	3ft.	3 mins.	1 min.	10 mins.	Alt. days	General irradiation, for a period of three or four weeks, is successful.
LEUCOCYTOSIS	Expose whole body	3ft.	2 mins.	1 min.	15 mins.	Alt. days	The rays are a natural stimulant of metabolism, hence their speedy correction of leucocytosis. Give twenty to forty treatments.
LEUCORRHŒA	Patient lying	Applicator in contact	2 mins.	1 min.	5 mins.	Daily	Use water-cooled lamp with quartz applicator. Treat for two to three weeks.
LOCOMOTOR ATAXIA	Expose spinal column	2½ft.	3 mins.	1 min.	10 mins.	Daily	The distressing pains and gastric crises can be effectually relieved by irradiation. Treat at frequent intervals during such phases.
LUMBAGO	Expose spine	12ins.	1 min.	½ min.	10 mins.	Daily	Prompt relief follows use of rays, but four or five weeks should be devoted to mastering the trouble.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
LUPUS	Expose site	6ins.	2 mins.	½ min.	8 mins.	Daily	All types show great improvement. Treatment is two-fold: *Local*, with water-cooled lamp, and also
LUPUS	Expose whole body	3ft.	3 mins.	1 min.	10 mins.	Daily	*General*, with air-cooled lamp. Continue treatment until condition clears up.
MARASMUS	Expose whole body, prone	3ft.	2 mins.	1 min.	15 mins.	Alt. days	Irradiation is a specific for Marasmus. Treat for three months.
MEASLES	Expose whole body	4ft.	3 mins.	1 min.	8 mins.	Daily	Notable success follows use of rays. Give ten to thirty treatments.
MOLES	Expose site	Lamp in contact	2 mins.	1 min.	6 mins.	Alt. days	Protect surrounding skin: use water-cooled lamp and treat until disappearance of moles.
MYALGIA	Expose areas	2ft.	2 mins.	1 min.	6 mins.	Alt. days	Sedative effect of actinic rays brings speedy relief. Continue treatment for four or five weeks.
NÆVI							Protect surrounding skin: use water-cooled lamp, and treat until nævi clear up.
NEPHRITIS	Expose whole body	3ft.	2½ mins.	1 min.	10 mins.	Daily	Chronic cases yield good results: improvement in metabolism and elimination of toxins being marked. Give treatment for several weeks.
NEURALGIAS	Expose areas	2ft.	2 mins.	1 min.	5 mins.	Daily	Analgesic effect of rays produces quick response. Treat for two or three weeks.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
NEURASTHENIA	Expose whole body, prone	4ft.	3 mins.	2 mins.	15 mins.	Alt. days	Stimulation of endocrine glands: increases calcium and phosphorus, together with analgesic effects, contribute to effectual relief. Treat for several months.
NEURITIS	Expose areas	2½ft.	2 mins.	1 min.	6 mins.	Alt. days	Rays act upon nerve fibrils, and speedy relief occurs. Carry on treatment for five or six weeks.
OBESITY	Expose whole body	3ft.	2 mins.	½ min.	10 mins.	Alt. days	Increased oxidisation causes fat to disappear. Treat for two to three months.
OTITIS MEDIA	Expose ear only	12ins.	2 mins.	½ min.	5 mins.	Daily	Irradiation eases pain, checks inflammation and promotes resolution. Give three weeks' treatment.
PARALYSIS AGITANS	Expose whole body	2ft.	2 mins.	1 min.	15 mins.	Twice weekly	Marked improvement follows irradiation. Treat for six months or more.
PERNIO	Expose parts	6ins.	1 min.	½ min.	4 mins.	Alt. days	Relief quickly obtained. Give twenty to thirty treatments.
PHARYNGITIS	Patient lying	Applicator in contact	3 mins.	1 min.	5 mins.	Daily	Prompt relief if passages cleaned before using rays. Treat for two to three weeks.
PILES	Patient kneeling holding buttocks apart	Applicator or quartz rod in contact	2 mins.	1 min.	4 mins.	Repeat when reaction gone	Use water-cooled lamp with quartz applicator or rectal speculum. Continue until piles have entirely gone.
PLEURODYNIA	Expose pleura	2 ft.	1½ mins.	½ min.	5 mins.	Daily	Analgesic effect of rays produces quick relief. Continue for seven or eight weeks.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
PNEUMONIA, BRONCHO		2ft.	2 mins.	½ min.	4 mins.	Daily	The rays form an ideal prophylactic. Clinical data indicate duration of treatments.
PNEUMONIA, LOBAR		2ft.	2 mins.	½ min.	4 mins.	Daily	Increased resistance and prophylactic effect of rays manifested usefully. Treat for several weeks.
PORT WINE MARK		Quartz lens in contact	2 mins.	1 min.	8 mins.	Once weekly	Use water-cooled lamp, and expose to point of blistering. Continue for three months.
PROSTATITIS		Lamp at end of speculum	2 mins.	½ min.	5 mins.	Twice weekly	Water-cooled lamp should be used, with rectal speculum. Direct rays at the gland itself, and treat for three or four weeks.
PRURITUS		Water-cooled: In contact with speculum. Air-cooled at 8ins. distance	1 min.	1 min.	8 mins.	Twice weekly	Treat as above with water-cooled lamp, or with air-cooled as shown in other columns.
PSORIASIS		12ins.	3 mins.	1 min.	12 mins.	Twice weekly	Protect surrounding skin, exposing parts freely and fully to blistering point. Continue until cleared.
PHTHISIS		3ft.	4 mins.	½ min.	8 mins.	Twice weekly	Favourable results follow irradiation. Treat for six to nine months, with occasional intervals of one week.
PYORRHŒA	Use quartz applicator	8ins.	1½ mins.	½ min.	3 mins.	Alt. days	Scale teeth first, then use quartz applicator. Continue for one month.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
RACHITIS	Expose whole body	3ft.	2 mins.	1 min.	15 mins.	Daily or alt. days	Irradiation is a specific. Treat for six months or more, but occasional cases clear up in a few weeks.
RHEUMATIC FEVER	Expose whole body	3ft.	3 mins.	1 min.	12 mins.	Daily	Use irradiation as a prophylactic, or after cessation of febrile symptoms. Treat for three weeks.
RHEUMATISM, CHRONIC	Expose whole body	2ft. 6ins.	2 mins.	½ min.	10 mins.	Alt. days	Irradiation may be combined with radiant heat. Give thirty to sixty treatments. Even old cases clear up excellently.
RHEUMATOID ARTHRITIS	Expose whole body	3ft.	4 mins.	1 min.	20 mins.	Alt. days or twice weekly	As prophylactic, or for alleviation of long-standing cases. Very good results from three months' treatment.
RHINITIS	Expose chest and back	2ft.	2 mins.	½ min.	5 mins.	Alt. days	Excellent results. Give ten to thirty treatments.
RICKETS	Expose whole body	3ft.	2 mins.	1 min.	15 mins.	Daily or alt. days	Completely successful. Treat for several months, but some cases clear up in a few weeks.
RINGWORM	Expose site	18ins.	2 mins.	½ min.	5 mins.	Alt days	Protect surrounding areas, and use water-cooled lamp. Give ten to twenty treatments.
SCARLET FEVER	Expose whole body	3ft.	3 mins.	1 min.	10 mins.	Daily	Irradiate after subsidence of febrile symptoms. Very good results. Give eight to twenty treatments.
SCIATICA	Expose area	3ft.	2 mins.	½ min.	8 mins.	Alt. days	Use as analgesic. Give ten to thirty or forty treatments.
SEXUAL DEBILITY	Expose whole body	2ft. 6ins.	2 mins.	1 min.	15 mins.	Alt. days	Stimulative effect of rays upon glands yields satisfactory results. Treat for two months

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
SINUS, INFECTION OF	Expose sinus	12ins.	1½ mins.	½ min.	6 mins.	Daily	Cleanse parts and fully irradiate. Very quick and good results. Give eight to twenty treatments.
SKIN, TUBERCULAR LESIONS OF	Expose area	6ins.	1 min.	¼ min.	4 mins.	Twice weekly	Results amazing to those unaccustomed to seeing these effects. Treat for three months.
SOFT CHANCRE	Expose site	Apply quartz lens	1 min.	½ min.	5 mins.	Alt. days	Water-cooled lamp is best. Treat for two months.
SPINAL CORD DISEASES	Expose spine	2ft.	2 mins.	½ min.	15 mins.	Twice weekly	Irradiate spinal cord. Treat for eight or nine months. Very good results.
SYCOSIS	Expose site	8ins.	1 min.	½ min.	3 mins.	Twice weekly	Remove hair as far as possible. Wonderful success recorded. Give about twenty treatments.
SYPHILIS	Expose site	18ins.	1½ mins.	½ min.	6 mins.	Daily	The lesions clear up under irradiation. Treat for four months.
TEETH, BLANCHING OF	Expose teeth: protect mouth	12ins.	3 mins.	1 min.	10 mins.	Twice weekly	Isolate teeth with rubber mask. One or two treatments suffices.
TINEA TONSURANS	Expose site	18ins.	2 mins.	½ min.	5 mins.	Alt. days	Protect surrounding areas. Give fifteen to twenty treatments.
TONSILLITIS	Expose site: Protect surrounding parts	Use quartz rod in contact	1½ mins.	½ min.	4 mins.	Daily	Thoroughly clean affected area. Give ten to fourteen treatments.

Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
TORTICOLLIS	Expose whole body	3ft.	2 mins.	1 min.	10 mins.	Twice weekly	General irradiation is best. Twenty to thirty treatments usually needed.
TRENCH FEET	Expose feet	2ft.	4 mins.	1 min.	12 mins.	Twice weekly	Protect surrounding areas. Half a dozen treatments usually suffices.
TRENCH MOUTH	Expose mouth	Use quartz lens in contact	1½ mins.	½ min.	4 mins.	Twice weekly	Quick recovery by irradiation. Give about thirty strong treatments in all.
TUBERCULOSIS, BONES AND JOINTS	Expose parts	2ft.	2 mins.	1 min.	10 mins.	Alt. days	Remarkable success. Give three to six months' treatment.
DERMATITIS	Expose site	2ft.	2 mins.	1 min.	6 mins.	Twice weekly	Rapid healing as the result of irradiation. Treat until normal.
GLANDULAR	Expose whole body	3ft.	3 mins.	1 min.	12 mins.	Alt. days	If possible, treat before pus formation. Continue until glands show normality.
PERITONITIS	Expose whole body	3ft.	2 mins.	1 min.	10 mins.	Alt. days	Great success. Give twenty to forty treatments.
ULCERATIVE	Expose site	2ft.	2 mins.	1 min.	6 mins.	Twice weekly	Speedy clearing up under irradiation. About ten treatments usually suffices.
ULCERS	Expose site; protect surrounding area	18ins.	2 mins.	1 min.	6 mins.	Alt. days	Even chronic cases clear up quickly. Treat until ulcer quite gone.

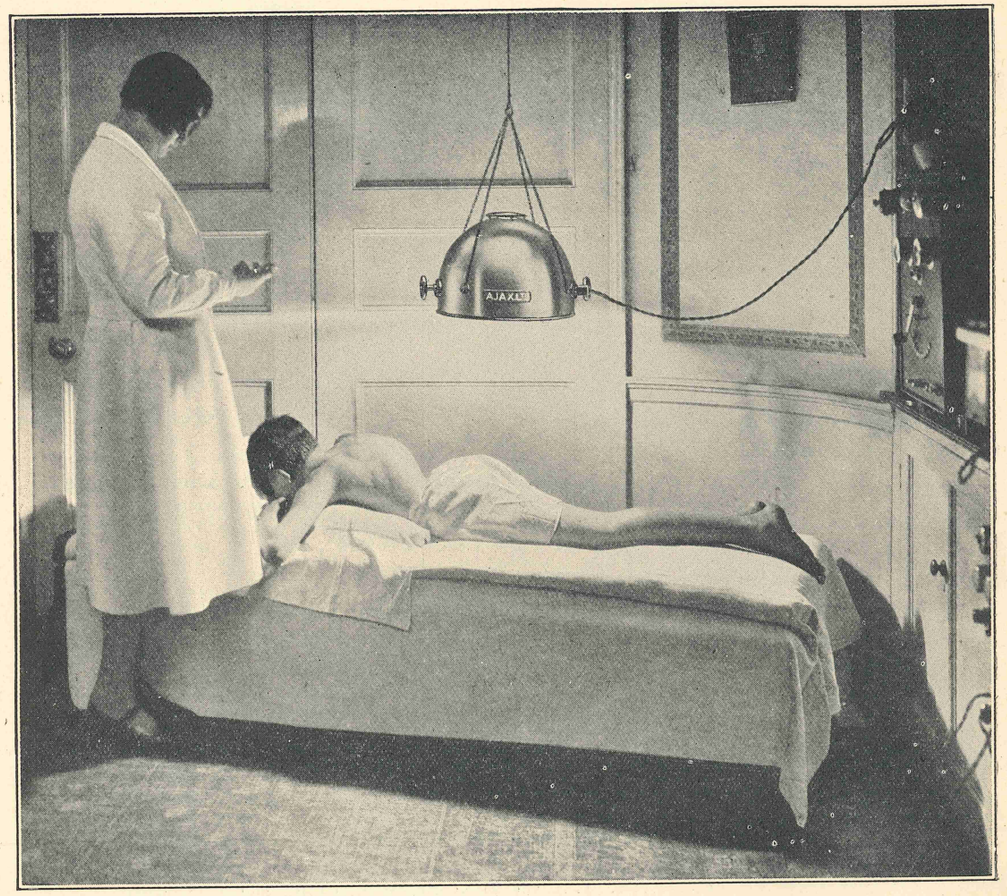
Ailment.	Position of Patient.	Distance between Lamp & Patient.	Exposure. First Exposure.	Exposure. Increase by.	Exposure. Max.	Frequency of Treatments.	General Notes and Prognosis.
URTICARIA	Expose parts	2ft.	2 mins.	1 min.	8 mins.	Alt. days	Irradiation soon relieves—often at first treatment. About fifteen treatments usually needed.
VARICOSE VEINS	Expose site	2ft.	1½ mins.	½ min.	8 mins.	Twice weekly	Old and obstinate cases respond markedly. Give fifteen to thirty treatments.
VARICOSE ULCERS	Expose site; protect surrounding area	12ins.	1 min.	¼ min.	4 mins.	Twice weekly	Irradiation is a specific. Treat until quite normal.
VASO-DILATION	Expose area	18ins.	2 mins.	¼ min.	3 mins.	Alt. days	The result of absorption of rays by skin. Long exposures result in vaso-constriction.
WHOOPING COUGH	Expose chest and back	2ft.	2 mins.	1 min.	5 mins.	Alt. days	Cough ceases after two or three treatments. About eight or ten should be given.
WOUNDS, HEALING OF	Expose site	2ft.	1 min.	½ min.	6 mins.	Alt days	Particularly good results from irradiation, even in old wounds. Treat until healed.

From *Ultra-Violet Light Therapy*, by Dr. T. Clyde McKenzie, M.B., Ch.B., and A. A. King.

"Modern apparatus is not only efficient, it is also easy to manipulate, so that the novice need have no more anxiety in using it than he has over his motor car. The work of those who have produced the so-called "artificial sunlight" has been well done. Lamps can be obtained which supply Ultra-Violet Radiation constant as to strength and quality; to the practitioner is left only the purely medical business of treatment."

AJAX "SUNLIGHT" APPARATUS IN USE

SUSPENSION MODEL EMITTING ULTRA-VIOLET RAYS DIRECT ON TO PATIENT AT ANGLE OF 90°.



This photograph was taken in a well-known West End Clinic and this particular patient, a case of Spinal Curvature and Anterior Poliomyelitis, showed remarkable improvement after a few exposures. The lamp is three feet distant from the patient, it being the initial exposure, and duration of treatment was two minutes which was of course increased at subsequent sittings. It will be noticed that artificial silk slips are worn by the patient, this material being practically 60 per cent. opaque to U.V. Rays. The Ajax goggle, which cuts out all U.V.R., is worn by both patient and operator. The duration of treatment is carefully timed with the "Ajax" Timing Recorder.

THE CHOICE AND ROLE OF VARIOUS U.V.R. GENERATORS

MERCURY VAPOUR, TUNGSTEN AND CARBON ARCS

PRECISE scientific details of the relative therapeutic merits of different generators will be found in a number of works by authorities on the subject; we think that it is beyond the realm of this work to touch upon that ground, but that we should give certain information that will help the practitioner in his selection of apparatus.

The ideal manner is to have all three sources of generation of U.V. Rays at one's disposal, because each kind is better than the others in some way or another for specific purposes.

A prevailing opinion is that the *maximum* dosage should be given with consequent *minimum* duration of each treatment.

This certainly applies when a large number of patients have to be treated daily as apart from Collective and Mass Treatment.

It is a fact that to date the maximum output of Ultra-Violet Rays is obtained by means of the Mercury Vapour Quartz Burners, the volume being dependent principally on the length of the arc.

Usually, and for the sake of comparison only, these burners vary from 1,500 to 2,000 c.p. to a maximum, in the better class apparatus, of 4,500 c.p., and the volume of U.V. Rays is proportionate to these figures and to the number of burners used.

The Stand Model apparatus, with double spherical mobile hoods, adjustable to height and for any incidence, is most suitable for general purposes and for Local and Spot Treatment also.

This type is greatly favoured, and can be considered to be a perfectly satisfactory actino-therapeutic apparatus.

For Local and Spot Treatments, however, the pure Tungsten Arc not only emits a great volume of U.V. Rays of particular curative value, but it is also claimed that as the rays are more pronounced at about 2,300 to 2,500 Ångstroms, it is more effective in certain cases than the Mercury Vapour or other arcs.

Unfortunately, pure Tungsten can only be used on Direct Current, and unless available, this generating arc is ruled out.

The use of Tungsten Arc Lamps is thus restricted, and other drawbacks are the smell and smoke produced.

Tungsten-Cored Carbon Arcs, however, can be used with either Direct or Alternating Current, and whilst not of equal power, are very efficient.

We arrive now at Carbon Arcs of various types.

The output of U.V. Rays with pure Carbon is negligible, and cannot possibly be considered to be of any therapeutic value beyond the radiated heat and infra-red rays.

Tungsten-Cored Carbons have already been referred to, but we have also a wide range of carbons cored with pulverised iron, nickel and other metals, and each metal gives a different spectrum, and therefore varies in active value.

Obviously a mixture of metals will give the best output of U.V. Rays, and the spectrum given by the Polimetallic Carbons, for instance, fully demonstrates this.

Carbon Arc Lamps are made up in single arcs for ordinary purposes, and in portable form for all voltages, and are eminently suitable to give "Sunlight" Treatment in patients' own homes.

When practising Actino-Therapy, it is essential to be provided with a *portable* lamp, whatever other units may be used in the surgery, the clinic or the treatment centre.

Small apparatus of this kind are also made, of low power, at reasonable cost, that can be safely recommended for patients' own use in the home for the tonic effect or just mild treatment under the doctor's supervision or prescription.

Lamps of the multiple Polimetallic Carbon Arc type are more especially favoured for Hospital, Collective or Mass Treatments, and should be automatic in functioning.

Mercury Vapour Quartz Burner Lamps, however, are freely used for these purposes, but whatever kind of unit is employed, it should be so arranged that the patients are subjected to the influence of the U.V. Rays during the treatment *from all sides,* that is to say, that in a square or rectangular room, there should be a generating unit on two or more sides, the patients walking in file and reversing each round to get equal treatment over the whole body.

The choice of lamps primarily depends upon requirements, and we hope that these remarks will be of assistance in determining the nature of or the range of apparatus that should be installed.

ELECTRICAL ENERGY AND ELECTRO-MEDICAL APPARATUS

In order to obtain the best functioning of all electrical apparatus and particularly those for medical use, it is essential that the correct Voltage and nature of current should be given to the suppliers when ordering.

One can easily ascertain the Voltage of the Mains from a plate that is usually fixed on the meter or from the meter card, but failing these, from the generating station.

In the case of Direct Current, the Voltage alone is required, but for Alternating Current the periodicity should be given and whether single or multiple phase; this latter information is necessary because in many cases auto-transformers have to be used, and unless these are made in strict accordance with the precise nature of the current, they obviously cannot function satisfactorily.

It is also very important that the installation and the fuses should be suitable for the *amount* of current that is to be used.

A 5 amp. circuit is sufficient for the minor apparatus, and few of the more powerful ones require more than 10 amps., except in the case of Multiple Carbon Arcs, some of which require a 50 amp. circuit.

When several apparatus may be in use concurrently the installation and fuses should be arranged accordingly.

EQUIPPING A "SUNLIGHT" CLINIC

IT is now possible to equip a small "Sunlight" Clinic at a reasonable cost combined with efficiency.

The room selected should be light and airy, but at the same time care should be taken to eliminate draughts. The colour scheme generally is immaterial, but the walls should have a non-reflecting surface —a matt surface of grey being suitable.

In selecting apparatus much depends on the work to be done, but leaving aside the requirements of the specialist, the most useful lamp for the General Practitioner is the air-cooled Quartz Mercury Vapour Lamp. With a lamp of this type both flood and local treatment can be given at will; it is easy to operate, requires no technical knowledge of electricity and is economical to run, the running current consumption being very low. Moreover, the results are generally both quick and satisfactory.

In the treatment room itself a suitable couch and stools or chairs are necessary, a fair supply of sterilisable goggles, a reliable treatment alarm clock, a thermometer and some form of artificial heating.

The waiting and dressing rooms provided depend on the accommodation available, but the latter is of course absolutely necessary unless the treatment room is sufficiently large to permit of partitioning or curtaining off.

The treatments themselves must be given by the doctor himself, or by a qualified operator under his supervision, and accurate and detailed case notes kept of each individual case, together with a record of length of exposure, distance, part exposed, etc.

Always keep a supply of suitable fuse wire available, as it is very inconvenient to have to wait for an electrician to come and replace fuses during a busy period. The switches, fuses, etc., should also be fitted out of reach of children.

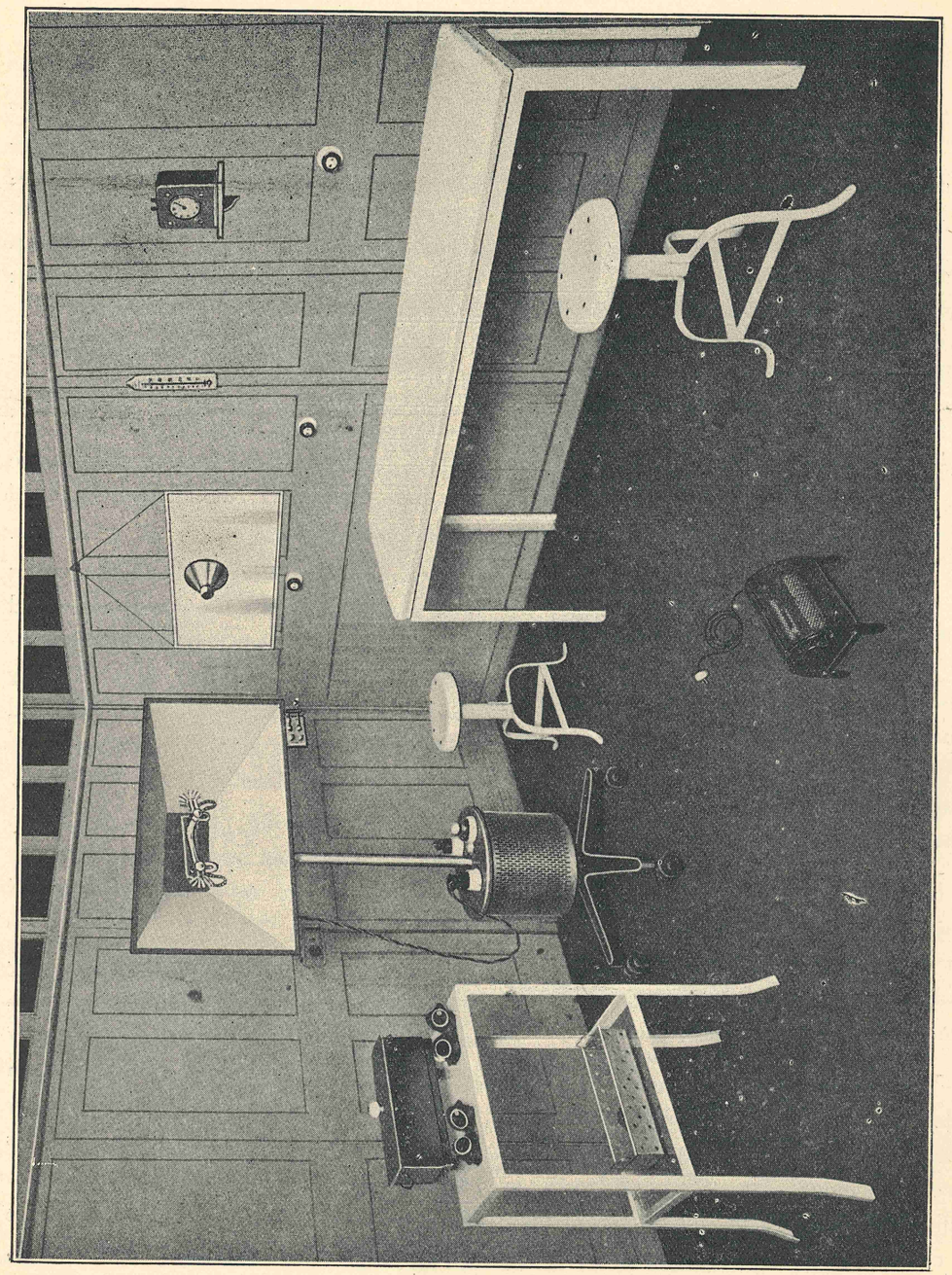
With a mercury vapour lamp the burner must always be kept scrupulously clean and the doctor should always attend to this himself, as quartz is extremely fragile. Lightly cleaned with a silk cloth and methylated spirit or alcohol is all that is necessary to get the utmost efficiency from the burner.

On the following page will be found illustrated a suitable range of apparatus for the equipping of a small "Sunlight" room.

Certainly the equipment shown is only a rough idea of what is wanted, but with such an outfit all that is strictly necessary is present. As the clinic grows, certain carbon arcs, tungsten arcs, lamps specially other apparatus can be added, such as designed for local treatment, etc.

The cost of such an installation is also a consideration and should not exceed £50.

SUGGESTED APPARATUS for a SMALL "SUNLIGHT" CLINIC



The illustration shows a collective treatment model Mercury Vapour Lamp with a detachable screen fitted with quartz lens and iris diaphragm for local and spot treatment; a massage plinth; two adjustable white enamelled stools; a white enamelled dressing table; a sterilizer for goggles; several pairs of sterilizable goggles; signal alarm clock; thermometer and electric heater. A set of equipment such as described herewith could be purchased for under £50.

COLLECTIVE "SUNLIGHT" TREATMENT

AN UNIQUE SYSTEM FOR MASS TREATMENT OF AS MANY AS 600 MEN PER HOUR FOR MINERS, ETC.

THE health of the coalminer is of equal importance to himself, to his industry and to the nation. In outlining the following scheme, I am not attempting to deal with health conditions underground, but with the basic fact that, whether on night or day shifts, the miner is deprived of the beneficent rays of natural light and more particularly of sunshine.

It is obviously necessary to restore to the miner the benefits derived from natural light and it only remains to find a sound and economical system under which it can be done.

Setting aside the idea of any underground system of ultra-violet radiation for the miner, let us consider what can be done for him after work.

The moment at which the miner can be given the full benefits of artificial sunlight irradiation is that at which he leaves his pithead bath. His skin is now clean and warm and most fit for absorption of ultra-violet rays.

In framing this scheme I have considered four factors—convenience, length of time necessary, cost and positive efficiency.

I have based my scheme upon a minimum of five minutes' treatment per man per day at an installation cost equivalent to one week's wages of 100 men, and at a moderate daily cost dependent on the current consumption and management charges.

It must be clearly understood that there is no suggestion here for dealing with the sick or diseased, although the apparatus could, under medical direction, be used for such a purpose when not otherwise engaged.

In the plan on page 57 I have sketched an installation suitable for dealing with men at the rate of 100 in 10 minutes, 600 in an hour. The plan shows a 300 ft. track in a rectangular building, which may be a simple low-built shed or low-built room adjacent to the baths. The height must be at least 8 ft., the total width of the track 5 ft. 3 in., and the track itself measured out in 1 ft. distances to facilitate timing and the steady progress of the men along the track.

Walking at the rate of 1 ft. per second, a comfortable and satisfactory speed, by following the track 100 men can pass through the room in 8 minutes 20 seconds, say, 10 minutes. While thus walking, each man will be subjected to an equal amount of ultra-violet radiation from lamps attached to the walls and suspended from the ceiling.

It is presumed that the men enter the room from their bath either nude or clad in the scantiest bathing drawers, discarding their working clothes before the bath and donning their rest clothes on leaving the sunlight room.

If each 1 ft. distance is marked by a slightly raised surface in the track, timing will be facilitated. I would also introduce a metronome or sounding clock giving distinct, audible one-second beats.

Ventilation should be through holes in a raised floor, fed with fresh air, and protected with outlet holes or slots in the ceilings. An automatic thermostatic temperature control should also be introduced.

The shaded portions on the plan indicate the range of effective radiation from each lamp. Having carefully measured the length and effectiveness of ultra-violet rays emitted by various apparatus, I favour

for this miners' sun bath, Automatic Carbon Arc Lamps fitted with tungsten, iron or polimetallic carbons. The sides and end of the track should be fitted with lamps having right-angled metallic-cored carbons, one vertical and one horizontal, and the others with vertical carbons radiating both tracks. The maximum effect can be obtained by lining the ceilings, walls and floor with reflecting material.

COST OF INSTALLATION

An approximate cost only can be estimated, because of different conditions prevailing and existence or not of suitable accommodation.

Twenty-eight automatic lamps, 8 horizontal and 20 vertical, are required at, say, £5 each ...	£140
Fitting-up, spaced distances, etc.	£100
Ventilation and other arrangements	£50
Total	£290

To this must be added the cost of generating the current, the plant for which will presumably exist in most instances.

Each lamp takes 45 volts 13 amps $=585 \times 28=16{,}380$ watts.

Ten minutes' maximum per 100 men: $16{,}380 \div 6=2{,}730$ watts for five minutes' treatment for each 100 men.

Polimetallic carbons will last for as long as five hours on either alternating or direct current, and the cost therefore is comparatively negligible.

As a 45-50-volt current will seldom be available, a transforming set would be necessary. This would be preferable to the use of resistances, with which otherwise each lamp would have to be provided, creating heat and causing loss of current.

The cost would not be very great, and it is easily ascertainable for either a transforming or an accumulator set.

C. A. COOPER.

ANOTHER SYSTEM FOR COLLECTIVE TREATMENT

For Hospitals or Treatment or Welfare Centres, when it is desired to treat a number of patients collectively a simpler and less expensive arrangement can be made than that detailed above.

A square room can be taken and adapted for the purpose, with U.V.R. generators of either Polimetallic Carbon or Mercury Vapour Arc type placed on two or more sides, in order to inundate the room with the Rays.

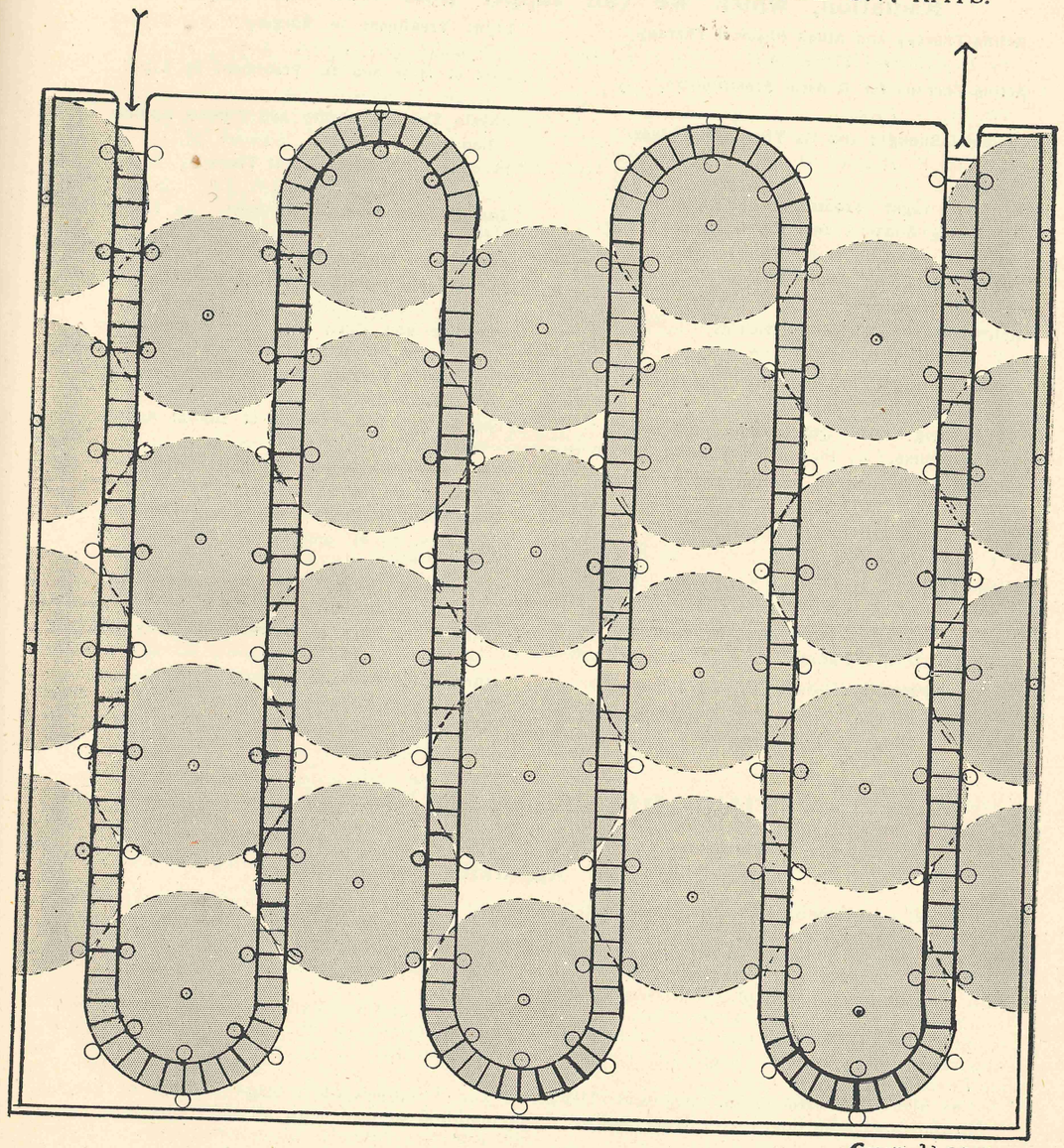
The principal object of such an installation is that each patient should be constantly in the Rays whilst under treatment; the usual manner is to sit the patients round the Lamp, but this is like sitting in front of a grate fire—one gets roasted in front whilst the back remains cold.

The scheme outlined in the preceding article enables the patients to be bathed on all sides in the rays continuously, and a similar object will be attained in a room to which we are now referring, if the walls are enamelled white, which will serve to reflect the rays and thus the patients will get the maximum benefit from them.

For such an installation, the Hospital Type Mercury Vapour Quartz Burner apparatus will be perhaps the best, and two of these would be sufficient for the treatment of say 12 to 15 patients at a time walking around the room, firstly in one direction and then reversing and walking in the opposite direction, so that all parts of their body would get equal treatment.

Ventilation and heating arrangements are very important in such an installation.

THE SHADED PORTIONS SHOW RANGE OF USEFUL U.V. RAYS.



Copyright plan of lay-out for "mass sunlight-bath." The shaded portions indicate the radiation area from each lamp, and it will be seen that by following the "ladder-track" the walker is in a continuous "sun-bath." The track is marked in 1ft. distances. A Carbon Arc Automatic burner is at the centre of each circle and half circle.

Books of reference are published on the technique of Ultra-Violet Radiation, which we can supply post free on request.

"**Actino-Therapy and Allied Physical Therapy,**" by Dr. Howard Plank, M.D. 35/9

"**Actino-Therapy for General Practitioners,**" by Dr. H. G. Falkner 8/–

"**Artificial Sunlight and Its Therapeutic Uses,**" by Dr. F. Howard Humphris, M.D. (4th Edition) 11/3

"**Artificial Light Treatment of Children in Rickets, Anæmia and Mal-Nutrition,**" by Dr. K. M. L. Gamgee 11/3

"**A Text-Book of Actino-Therapy,**" by Dr. D. D. Rosewarne 9/6

"**Actinotherapy for Dental Diseases,**" by Dr. F. Talbot, L.R.C.P., L.D.S. (Eng.) ... 5/6

"**Basis of Light in Therapy,**" by Herman Goodman, B.S., M.D. 15/9

"**Bestrahlung mit Quartzlampe Kunstliche Hohensonne,**" by Prof. Hugo Bach (trans.) 8/–

"**Clinical Application of Sunlight and Artificial Radiation,**" by Dr. E. Mayer 45/9

"**Facts About Artificial Sunlight,**" by Dr. E. L. Ash, M.D. 2/9

"**Helio-Therapy,**" by Dr. A. Rollier (2nd Edition) 20/9

"**Les Rayons Ultra-Violet en Therapeutique,**" by Dr. Jean Saidman 13/3

"**Light and Health,**" by M. Luckiesh and A. J. Pacini 23/3

"**Light Treatment in Surgery,**" by Dr. O. Bernhard (St. Moritz) 21/9

"**Loss of Hair and Its Treatment by Light,**" by Dr. F. Nagelschmidt 6/4

"**Physio Therapy Theory and Clinical Application,**" by Dr. H. E. Stewart, M.D. ... 32/3

"**Practical Ultra-Violet Light Therapy,**" by Dr. T. Clyde Mackenzie, M.B. 6/6

"**Sunlight and Artificial Sunlight,**" by Harold Wigg 2/–

"**Sunlight As Healer,**" by Dr. F. Thedering... 2/8

"**Sunlight and Health,**" by Dr. C. W. Saleeby, M.D. (3rd Edition) 5/6

"**Sunshine and Open Air,**" by Dr. Leonard Hill, M.B. (3rd Edition) 11/-

"**The Quartz Mercury Vapour Lamp,**" by Dr. J. Bell Ferguson, M.D. 7/-

"**The Science and Practice of Dental Actino-therapy,**" by T. V. Tanguy 6/6

"**The Spectroscopy of the Extreme Ultra-Violet,**" by Theodore Lyman, Ph.D. ... 7/-

"**Ultra-Violet Radiation and Actino-Therapy,**" by Drs. E. H. and W. K. Russell, M.D. (3rd Edition) 21/9

"**Ultra-Violet Rays,**" by Dr. Percy Hall, M.R.C.S. (3rd Edition) 13/3

"**Ultra-Violet Rays in Dermatology,**" by Dr. R. Bernstein, M.D. 13/3

"**Ultra-Violet Rays in General Practice,**" by Dr. W. Annandale Troup, M.C., M.B.... 5/-

NOTE.—Orders for above addressed to The Publishing Department, Ajax, Ltd., 117, Central Street, E.C.1, can be executed by return of post.

INFORMATION BUREAU

Full particulars available concerning all Apparatus. Ideas for New Apparatus carried out.

Whilst commending all the above-mentioned Works to our readers and incidentally this present volume, with regard to the Theory and Practice of U.V. Irradiation, we know that there will still arise certain questions of detail upon which our clients will require elucidation.

We have, therefore, organised a Service or Inquiry department where all inquiries are dealt with immediately on receipt.

Seemingly minor points are often of great importance and we shall always be most pleased to place the benefit of our very wide and lengthy experience in the manufacture of U.V.R. Apparatus in particular and all Electro-Medical Apparatus in general at the service of all Practitioners.

As actual Manufacturers, Inventors, Designers and Patentees of a large number of various Scientific Apparatus and Instruments, we are fully qualified to deal with all questions relating to them.

We have also an experimental department where clients' own ideas can be worked out and special apparatus built up for specific purposes.

We court inquiries with regard to any new apparatus that can be of service to the Medical Profession.

"AJAX" MERCURY VAPOUR "SUNLIGHT" LAMPS

for

ULTRA VIOLET IRRADIATION TREATMENT

INSTRUCTIONS for INSTALLATION—USE—CARE

NOTICE.—The handling of Ultra-Violet Ray Generating Units or Lamps is very simple, and in fact in no way more difficult than just ordinary Electro-Medical apparatus.

The instructions for use are given at length however to prevent all possibility of error, and inobservance of these instructions nullifies our Guarantee.

INSTALLATION

(1)

STAND MODEL FOR INDIVIDUAL, GENERAL, LOCAL OR SPOT TREATMENT

APPARATUS

Carefully examine and verify that all parts are intact. Notification should immediately be given of any damage or loss in transit.

There is a "quick break" switch on the apparatus, but a 10 amp. switch is required for the wall plug that we provide, and before fitting up, carefully choose the most convenient point in the clinic in order to avoid eventual unnecessary moving about of the Lamp.

Ascertain the polarity when the current is "direct," as this is of the greatest importance.

For this purpose we supply polarity paper with each apparatus; wires from the mains leading to the wall plug should be bared and placed about 1 in. apart on the dampened paper; the "negative" pole will give a bright red colour.

Once the polarity is determined the plugs are so constructed that errors are impossible.

A long length of special flexible wire is provided to lead from the mains to the base of the Lamp, and a second one from the base of the Lamp to the Hood.

BURNER

For Direct Current

The negative pole should always be taken to the right-hand side of the apparatus; carefully verify that the Burner is intact. There are red beads on the wire at the "positive" end, and black on the "negative" end, which latter is further denoted by the aluminium wing cooler.

A piece of silk should be used for handling the Burner, or preferably silk gloves.

The fingers themselves must *not* come in contact with the quartz.

Two projecting rod holders with fastening knurled nuts will be found, upon which the Burner is fitted by means of four small steel staples, which must be adjusted to slide on, *absolutely easily and freely*. The knurled nuts are then replaced to prevent the Burner from falling off.

Attach the negative and positive wires to the respective poles.

Make quite sure that the rocking-arm arrangement is perfectly clear and acts without jarring.

For Alternating Current

Carefully verify that the Burner is intact. The polarity does not enter into the question here, but the double end of the Burner must be placed on the left-hand side where there are two contacts, otherwise it is fitted on exactly the same as the D.C. Burner.

USE

Generally speaking, the *initial maximum exposure* should never exceed 1½ *to* 2 *minutes at* 2½ *ft. to* 3 *ft. distance.*

Subsequent length of exposures must then be governed by the results of the first treatment. It should be borne in mind that a *new burner* is extremely rich in U.V.R., and great caution should be exercised in using it during the first series of treatments.

Having carefully installed the apparatus and fitted the Burner as above explained, proceed as follows:—

1. Turn off the switch at mains.
2. See that "quick-break" switch on the apparatus is "off."
3. Place regulator arm on the first stud.
4. Turn on the main switch and then the "quick-break" apparatus switch.
5. Hold the black disc controlling the rocking-arm and gently tilt the Burner and bring it back to a horizontal position; with direct current the Burner will then at once light.

   With alternating current a certain number of tilts will be necessary. It will now take three minutes for the Burner to become well lit.
6. Carefully study the Hood adjustment to get correct direction and incidence of the rays. The inner hood revolves completely round, inside the outer hood, and the precise gap can be made from a small slot to the complete capacity.

   The inner ebonite disc on the right-hand side of the apparatus serves to secure the outer hood, and the middle one the inner hood. The outer disc is fixed to the inner hood, and controls its movement.

   These discs are turned clockwise to lock the hoods in position.

   It is well to experiment with the fixing of the hoods before starting the treatment.

For Local or Spot Treatment

When the Burner is well alight, regulate height of the lamp and place the hoods in position to throw the rays as required on the patient, the volume being regulated with the Iris Diaphragm.

(Instructions for use of the Compresser Quartz Lens and the Quartz applicators for cavity treatments are issued separately.)

The rheostat regulator arm must not be moved from the first stud for this treatment with the inner hood closed.

For Complete Immersion and General Treatment

When the Burner is well alight, the regulator can be moved on to stud No. 2, and if greater power and volume are required, to studs Nos. 3 and 4, at two minutes interval; the lamp to be adjusted for height and the hoods for position as required.

For All Treatments

If a time switch or an "Ajax" Duration of Treatment timepiece are not used, then an "Ajax" time recorder watch is essential because the length of time of the treatment is of vital importance and mistakes easily occur otherwise.

The time must be reckoned from the precise moment that the patient is placed under the rays.

After having completed the treatment, if not already in that position, the regulator should be placed back to stud No. 1, the "quick-break" switch on the apparatus turned to "off," and the current cut off at the main switch and then the apparatus is ready with the usual procedure for the next treatment.

The Burner need not be turned off if there is only a short interval in the treatment of a number of patients.

It is preferable to keep the lamp burning rather than switching off and relighting, and although the lamp would thus be alight for short periods without being used, it is still the best policy; during such intervals the hood must be wide open.

If the lamp is lit with the regulator on any stud beyond No. 1, there is grave possibility of accident to the Burner.

By the methodical use above detailed all such accidents are avoided.

CARE

Once daily dust the whole apparatus with a feather duster, with long, soft, flexible plumes, flicking the dust off the Burner without the slightest knock.

Wipe the Burner very carefully with a piece of silk without letting the fingers come in contact with it. Use pure alcohol to remove stains.

Clean the hood when necessary with a soft rag wetted with methylated spirit, which for polishing should be mixed with plate powder or whiting. Polish the nickel-plated parts with a chamois leather or selvyt cloth, using a small quantity of metal polish in case of tarnish.

The knurled security nuts on the supporting rods of the Burner must always be screwed up into correct position, and the connecting wires of the Burners must always be tightly fixed in order to ensure good connection.

The castors will run more freely if the spindles are slightly oiled.

The care of the apparatus should be confided to one person only, and no one

else should be allowed to tamper with it under any circumstances.

(2)

Hospital Model for Collective Treatment

All the instructions for the STAND MODEL apply, bearing in mind that this apparatus is for Collective and Flood Light Treatments, and that it cannot be used for Local and Spot Treatments.

(3)

Suspension Model for Flood Treatment

Here again all the instructions for the STAND MODEL apply, excepting that this model is designed exclusively for individual Flood Light Treatment.

When installing, great care should be taken that the pulleys are firmly fixed to the ceiling and walls to avoid possible falling of the lamp on the patient, which might have serious consequences.

The counterpoise should be correctly weighted with small shot to give easy and fixed suspension.

This lamp must not be moved in any but an "up and down" direction, because the burner must not be thrown out of its essential, horizontal position.

Inspect the wire cable periodically to ensure perfect safety.

(4)

Table or Bench Model

This apparatus is made for General, Local and Spot Treatments, and all those instructions cited above that apply should be observed.

In Actino-Therapy, however, this model is not recommended, as it is not practical and there is considerable possibility of accidents, but for commercial and industrial purposes, such as colour-testing, etc., it is ideal.

Special Note.—It is advisable to arrange for treatments to follow one another in order to economise the current and the loss of time involved in getting the Burner thoroughly alight.

Essential Precautions

DO NOT under any circumstances expose the eyes to the ray; *always wear suitable goggles.*

DO NOT light the lamp with the rheostat on any other stud but No. 1.

DO NOT move the rheostat from No. 1 when using the lamp with the hood closed.

DO NOT fail to keep the apparatus perfectly clean, the maximum efficiency will then be obtained.

DO NOT allow anybody but a most responsible person to handle the Burner, as it is extremely fragile, and we cannot be responsible for damage after delivery.

DO NOT touch the Quartz Burner with the fingers.

DO NOT jar or shake the Burner after switching off—always allow it to cool down before touching it.

DO NOT move the Suspension Model from the horizontal plane and vertical position.

Note.—Over exposure is the only possible source of danger with this apparatus and the frequency and duration of treatments should be subjects of the greatest care.

INSTRUCTIONS FOR INSTALLATION, USE AND CARE OF AJAX PORTABLE AUTOMATIC CARBON AND TUNGSTEN ARC LAMPS

MANNER OF TREATMENT

The same ailments can be treated with these Polimetallic Carbon and Tungsten Arc lamps as with Mercury Vapour Quartz Burner apparatus, as shown on the tabulated lists (see *"Sunlight" Treatment*, pages 36 to 49), but in general, longer exposures can be given at closer range, as explained below.

INSTALLATION

Examine and verify that all parts are intact. Notification should immediately be sent of any loss or damage in transit.

Read most carefully the explanations given on the labels attached to all moving parts; remove the labels when you have understood the functioning.

(1) AUTOMATIC POLIMETALLIC PORTABLE CARBON ARC

This lamp can be used on either Alternating or Direct current, and on practically any voltage.

On the back plate of the apparatus are situated the "mains" current terminals, the quick-break knife switch, the magnetic blower switch and the voltage switch. All these parts are clearly labelled.

If your voltage is between 100—130 place the voltage switch in terminal marked "110"; if it is between 200—240 place in terminal marked "220."

Have the blower switch to "off" if giving local treatment with sliding front of lamp *in*, or "on" if giving flood treatment with front *out*.

Now connect up the lamp to the mains current.

See that the carbons are touching one another and forming a good contact.

The Lamp will now be ready for use.

USE

Generally speaking, the *initial exposure* should not exceed *5 to 8 minutes* at 12 to 18 inches distance for local or spot treatment and *10 minutes* at 24 inches for general or flood treatment.

Subsequent exposures must be governed by results, the basis of general treatment being: 12 minutes exposure at 12 inches distance with longer exposures at greater distances to a maximum of 30 minutes at 36 inches. (See page 82.)

With this apparatus, as a general principle, the nearer the patient can approach the arc, the source of the U.V. Rays, the better and quicker the results.

The duration and manner for local or spot treatment depends upon the nature and locality of the trouble.

Place the patient in the desired position and start the lamp by:

(1) Turning on the mains switch.

(2) Putting on the quick-break switch on the apparatus.

The Lamp should immediately light and burn evenly without attention until the carbons are burnt away.

If it does not light it is possible that the carbons are not touching—switch off the current and adjust.

Inside the front of the lamp at the left-hand side of the upper carbon will be found the brake rod.

When new carbons are fitted or the existing ones require adjusting, push in this rod, which will release the brake and allow the carbon holders to come together again.

Do not *force* the carbons apart; they move freely when the brake is released.

For Complete Immersion and General Treatment

In giving flood treatment the sliding front *must* be taken completely out, thereby permitting the rays to cover the largest area possible, also to help the cooling of the Lamp.

The blower can then be placed to the "on" position if desired.

This blower throws out the arc and intensifies it.

For Local or Spot Treatment

For Spot Treatment the blower *must be* in the "off" position and the detachable front fitted with an Iris Diaphragm brought into use. If much local or spot treatment is given the "Ajax" Water Cooled Lens should be used.

For All Treatments

If a Time Switch or an "Ajax" Duration of Treatment Time Signal are not used, then an "Ajax" minute recorder watch is essential, because the length of time of the treatment is of vital importance, and mistakes easily occur otherwise.

The time must be reckoned from the precise moment that the patient is placed under the rays.

Suitable goggles, such as the "Ajax" Goggles, should always be worn by both the patient and the operator whilst exposed to the rays.

After having completed the treatment the current should be turned off by means of the quick-break switch on the apparatus and the mains switch. It is advisable to turn off the current after each treatment to give the lamp as long as possible to cool.

CARE

Once daily thoroughly clean the whole lamp, particularly seeing that none of the working parts are clogged with dirt, carbon particles, etc.

The aluminium case should not be cleaned with metal polish or any other polish containing acid. The best preparation is methylated spirit and whitening.

The carbons should always be *firmly* secured in their holders.

(2) THE PORTABLE TUNGSTEN ARC

Most of the above instructions are applicable with the exception of those appertaining to the blower and automatic control of the arc.

In the Tungsten Arc, the electrodes are hand fed.

This Lamp can *only* be used on *DIRECT CURRENT*.

To light the lamp grasp the *left*-hand holder and press in the *right*-hand holder and the arc will immediately be struck; release the holders and allow them to spring back to their normal positions.

When the tungsten burns away to such an extent that the arc is broken, screw in the holders so that the arc is re-formed and maintained in a central position.

The length of exposure should be shorter than with the carbon arc, as pure tungsten is very rich in U.V. Rays.

The hood can be adjusted to any angle by just pushing or pulling the arm to the desired position. *It will remain in the position put without any locking device.*

The front plate should be placed in front of the arc for local treatment, leaving sufficient gap for air cooling and allowed to drop below arc for flood treatment.

(3) COMBINED CARBON AND TUNGSTEN ARC

All the above instructions apply. In this model it will be noticed that there is a switch governing the use of the Carbon and Tungsten parts of the apparatus, and this switch should be put on its right terminal before switching on the mains current.

SPECIAL PRECAUTIONS IN THE USE OF "AJAX" POLIMETALLIC CARBON AND TUNGSTEN ARC LAMPS

DO NOT attempt to adjust or replace Carbons or Tungsten Rods until the current is switched *off*.

DO NOT switch *on* the current until you have verified that the carbons are touching one another and that the switch gear is correctly arranged.

DO NOT use the "Blower" without removing the sliding front of the lamp.

DO NOT place the lamp on a polished table when using, as it becomes hot; use a tray or board or non-inflammable cover to rest it on.

DO NOT allow the apparatus to remain in a damp place.

DO NOT attempt to use these lamps without using protective Goggles for the eyes.

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WIGG, HAROLD,
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"SUNLIGHT" TREATMENT

Illustrated Technical Supplement

In the following pages will be found illustrations and descriptions of various Ultra-Violet Ray Generators and other Electro-Medical Apparatus.

The prices are quoted because it is thought that these will also interest our readers.

Space does not allow of the illustration and description of all apparatus used, but inquiries addressed to Messrs. Ajax, Ltd., will receive immediate attention and quotations and estimates forwarded on request.

ULTRA VIOLET RAYS

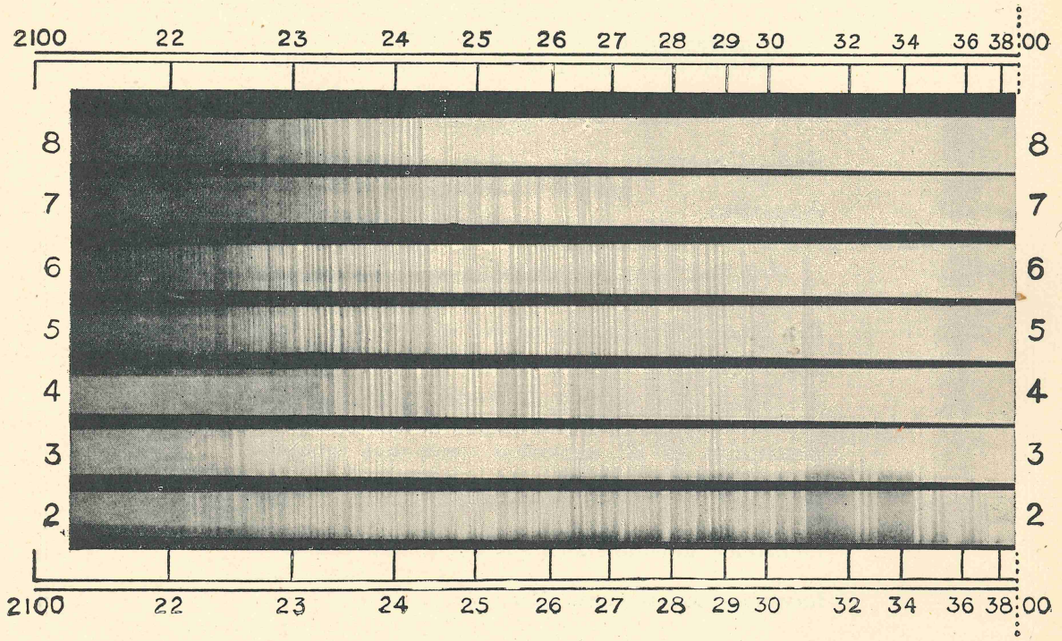
The volume and therapeutic value of these rays are indicated by the Spectrum of the Arc of the Generating Unit.

It is claimed that the most valuable are from 2400 to 3000 Angstroms for this treatment.

The spectrum photographs reproduced on this and page 13 indicate that the U.V. Rays are of great intensity and volume with the "Ajax" Mercury Vapour Lamp over a wide range and that the "Ajax" Polimetallic Carbons are superior to Tungsten and other cored carbons by reason of the closely packed lines over the *whole* of the range of useful rays as shown on the spectrum-photographs reproduced below.

These special carbons are composed of varying proportions of a number of different salts and metals of chosen molecular value to produce the maximum U.V. Irradiation whilst burning freely, easily and with perfect silent smoothness.

As it will be seen these spectra can only be most favourably commented upon as they are both *distinctive and of pronounced superiority.*



The exposure for these spectrum-photographs was in each case 20 seconds, *the same "Ajax" Portable Apparatus being used for all of them.* (Photographs by Mr. B. D. H. Watters.)

No. 2. TUNGSTEN CORED CARBONS. The spectrum here is good with an abundance of U.V. Rays.

No. 3. The same carbons as for No. 2, but the Rays have been passed through the water-cooled Quartz Lens Compressor and Concentrator Applicator. It is very evident that neither the distilled water nor the quartz Lens prevent the passage of the rays in the slightest degree.

No. 4. Also with the same carbons as No. 2 and with the Applicator of No. 3, but taken through the fine slit of the apparatus which has accentuated the lines from 2350 to 2900 Angstroms.

No. 5. POLIMETALLIC CORED CARBONS. These obviously give the very best result both by reason of the volume and closely packed lines; whilst the whole of the range of useful rays is well covered there is yet a quantity below 2400.

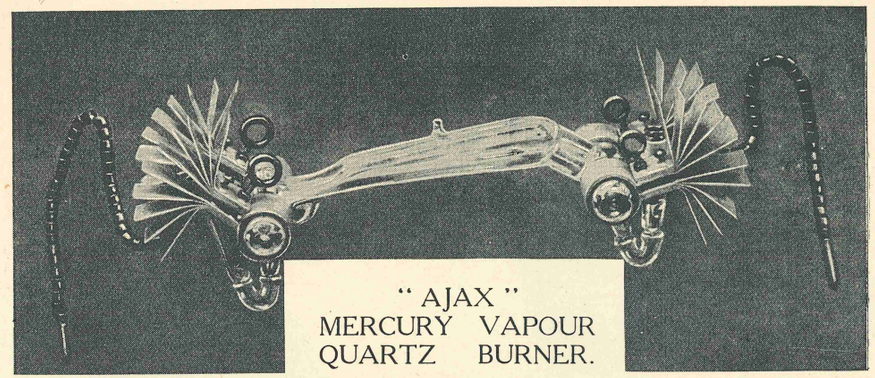
No. 6. Same carbons as No. 5, but through the fine slit of the apparatus. The result is practically the same as No. 5, which is a clear demonstration of the intensity of the rays.

No. 7. TUNGSTEN. Pure Tungsten rods were used in this instance, and as is well-known and shown, the Arc produces a good output of U.V. Rays.

No. 8. Same rods used as for No. 7, but taken through the Rock Crystal Compressor and Concentrator Lens, showing that this latter does not interfere with or stop the passage of any of the rays.

AJAX "U.V.R." "SUNLIGHT" APPARATUS

FOR ALL VOLTAGES. ALTERNATING AND DIRECT CURRENTS.

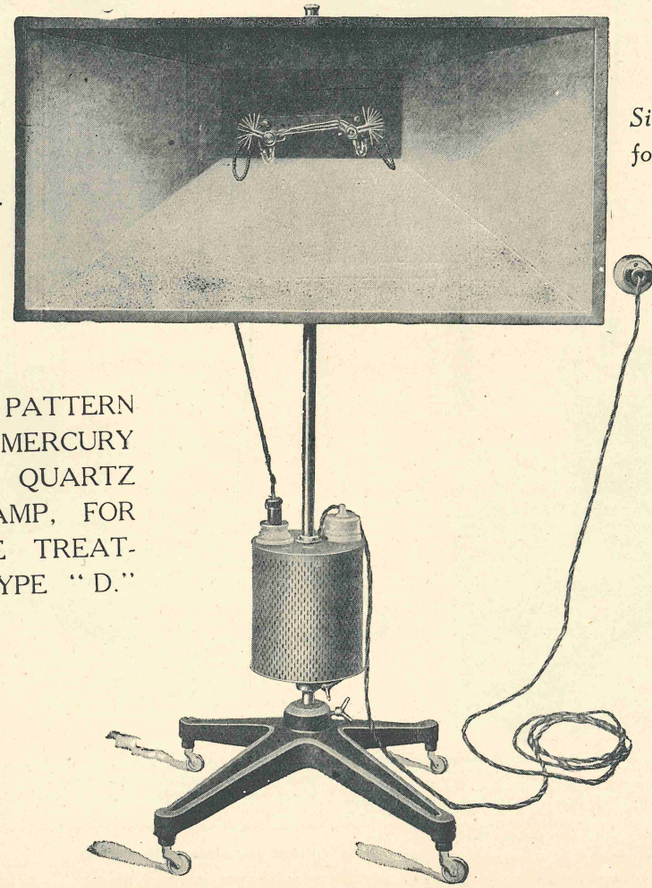


Our illustration shows an "Ajax" Pure Quartz Mercury Vapour burner, for use on Direct Current. Those for Alternating Current are of the double pole type, but otherwise are very similar. They are of faultless manufacture and allow free passage to the entire volume of Ultra Violet Rays from the arc. They are all fully guaranteed and their clearness and durability are unequalled.

Prices: For DC Models, £8, £9 and £10; for AC Models £12 and £14.

Illustration is of Direct Current Type.

Similar Model for Alternating Current.



HOSPITAL PATTERN "AJAX" MERCURY VAPOUR QUARTZ BURNER LAMP, FOR COLLECTIVE TREATMENT. TYPE "D."

This type "D" apparatus has been specially designed for collective or Hospital use.

The Reflector measures 36½in. by 18½in., and gives the maximum field of Ultra-Violet irradiation.

It is adjustable for any height, and three-pronged plugs ensure correct polarity.

The Reflector is highly polished and nickel-plated, and whilst of neat appearance the apparatus is soundly and strongly constructed.

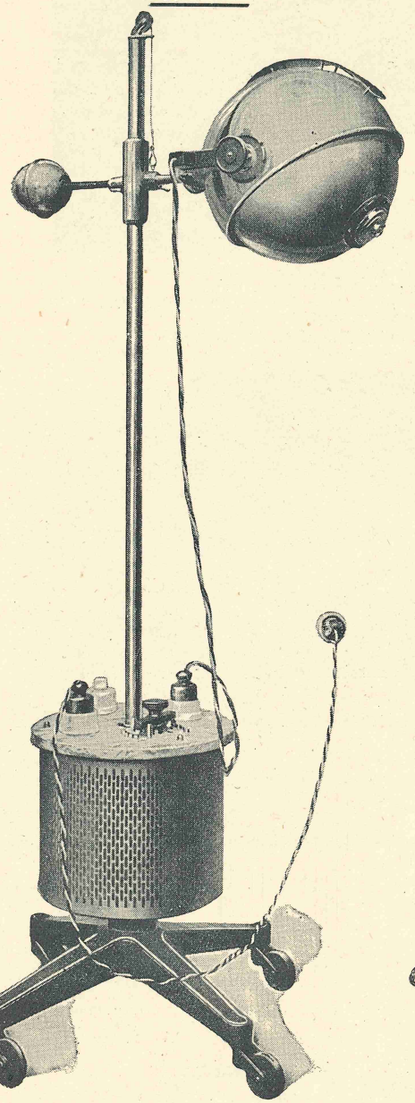
Prices complete with Burners as illustrated:
For Direct Current £25.

For Alternating Current with Transformer £40.

FOR ALL VOLTAGES.

ALTERNATING CURRENT STAND MODEL FOR INDIVIDUAL, LOCAL OR SPOT TREATMENT.

Type "C."



The apparatus is specially designed for Alternating current, and is supplied for all voltages.

The transformer is particularly efficient and has a variety of adjustments in order to give the exact voltage required. Mounted on handsome stand with counter-poise and double highly polished hood completely mobile to reflect the rays as required. Fitted with an Iris diaphragm for local and spot treatments. Adjustable to any height and any angle.

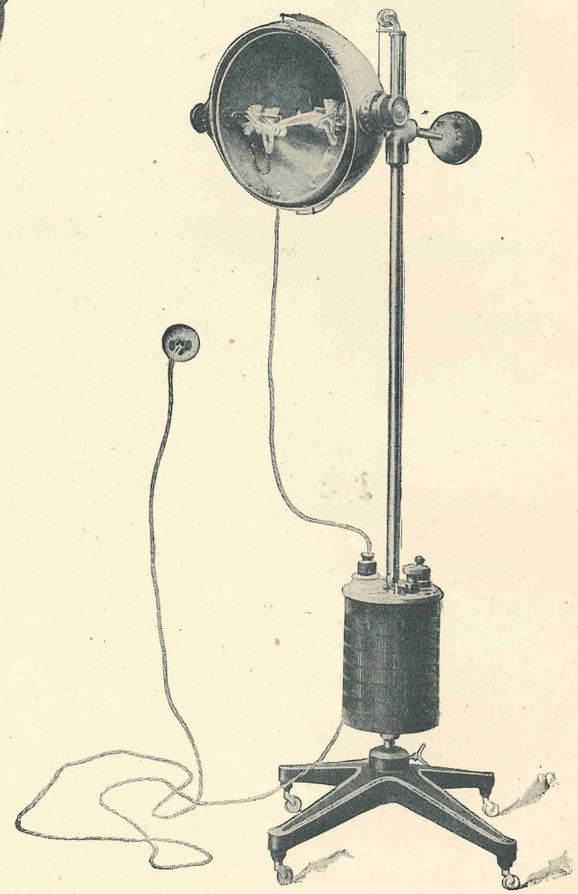
Price complete with Burner (as illustrated) **£44 0 0**

"New Standard" Model (see page 76) **£37 10 0**

"Mercuray" Model (see pages 73-74) - **£18 0 0**

DIRECT CURRENT STAND MODEL FOR INDIVIDUAL, LOCAL OR SPOT TREATMENT (110 VOLTS).

Type "A."



This Type "A" Model for 110 Volts Direct current is for individual complete immersion, or Local or Spot Treatment. It is built on the same lines as our other Stand Models, highly finished with double adjustable hood, as on types "B" and "C." It is complete with polarity Stand and Wall Plugs and rocking-arm instantaneous lighting.

Price complete with Burner (as illustrated) **£28 17 6**

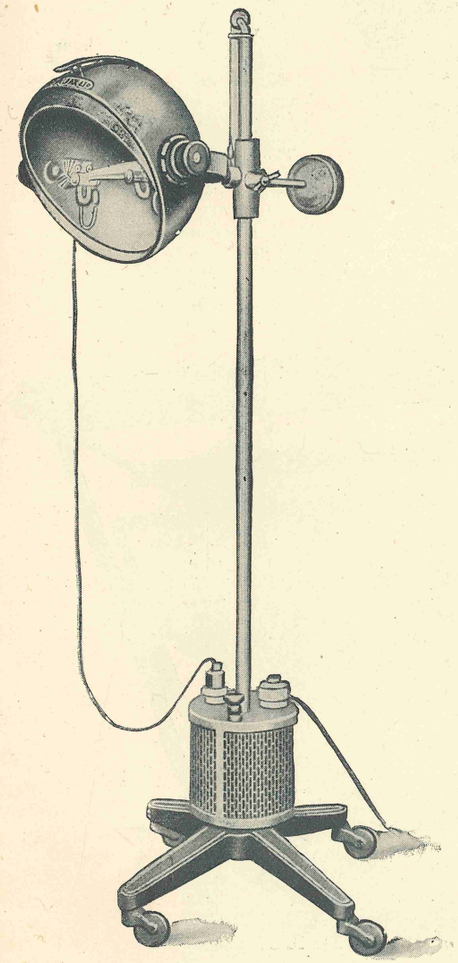
"New Standard" Model (see page 76) **£22 0 0**

"Mercuray" Model (see pages 73-74) - **£10 0 0**

FOR ALL VOLTAGES.

DIRECT CURRENT STAND MODEL FOR INDIVIDUAL, LOCAL OR SPOT TREATMENT (220 VOLTS).

Type "B."



As our illustration shows, this Model is the same as the Type "A," excepting that the resistance differs slightly because it is built specially for the 220 volts circuit. It has a double hood and an Iris diaphragm. It has the same fittings and handsome finish, and whilst elegant in appearance is particularly strongly built.

The up and down movement of all these stand models is exceedingly smooth and immediately adjustable.

Price complete with Burner (as illustrated) **£28 17 6**

"New Standard" Model (see page 76) **£22 0 0**

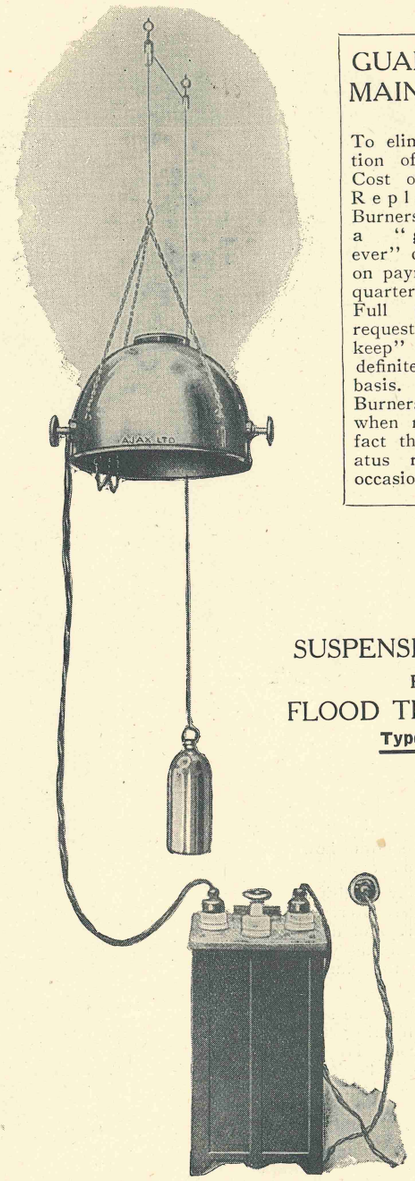
"Mercuray" Model (see pages 73-74) - **£10 0 0**

GUARANTEED MAINTENANCE

To eliminate all question of doubt of the Cost of Maintenance, Replacement of Burners, etc., in fact, a "guarantee for ever" can be obtained on payment of a small quarterly charge.
Full particulars on request by which "upkeep" is placed on a definite guaranteed basis.
Burners supplied free when required and in fact the whole apparatus replaced should occasion arise.

SUSPENSION MODEL FOR FLOOD TREATMENT

Type "E."



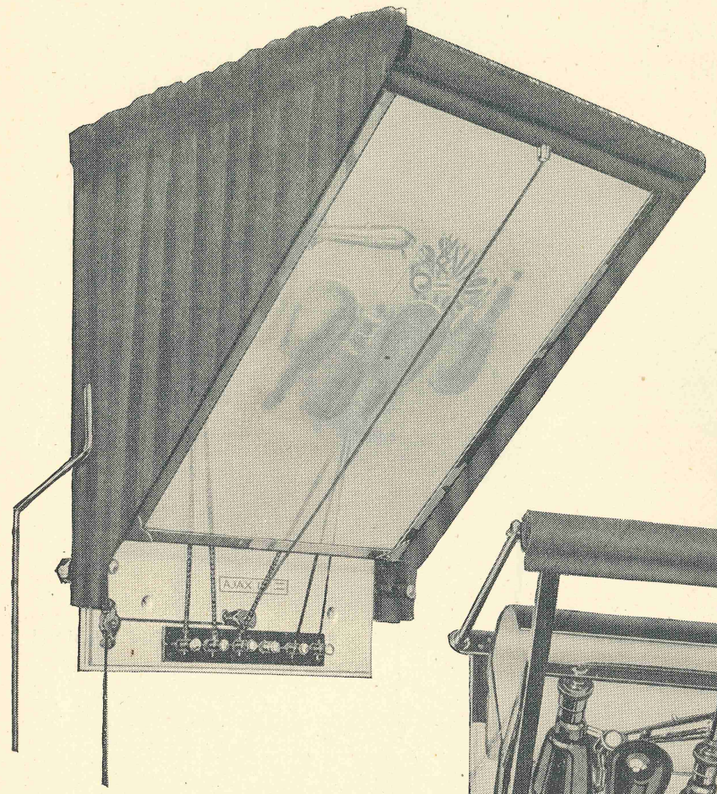
The manner of suspension is very simple, with counter-poise as shown. It is made for both Alternating and Direct current—all voltages. The illustration is of Type "E" 220 Volts Direct Current Model, complete with Mercury Vapour Quartz Burner, with marble top Resistance stand, Plugs and Wires, etc.

Price complete with Burner for Direct Current - - - - - - **£16 16 0**

Price complete with Burner for Alternating Current - - - - - - **£32 10 0**

The "AJAX" Flood Natural Colour "SUNLIGHT" Apparatus

for Bathroom, Clinics or Nursery, for Tonic Treatment.



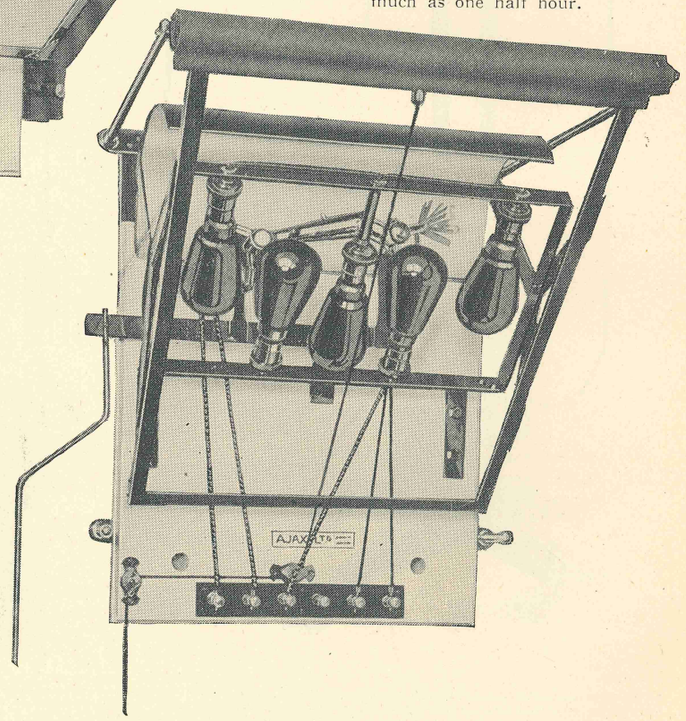
This illustration shows the apparatus in its complete form. It is fixed on the wall of a room within 6in. of the ceiling and will flood even a large room completely with U.V. Rays, which are best reflected from white enamelled walls.

A remarkable tonic effect is imparted particularly if the patient is naked. It gives, in fact, a real "Sunlight" Bath.

The ordinary electric lamps that are seen are of such colour that the ghastly effect of the Mercury Vapour burner is overcome and the light emitted closely resembles real Sunlight.

The front part is fitted with special transparent material that allows of the passage of practically the total U.V. Rays and a Silk blind is added to protect patients with particularly sensitive skins.

Goggles are not needed for treatments with this apparatus and the duration of the treatment can be as much as one half hour.



This illustration shows how the apparatus is built up.

There is a highly polished reflector behind the Mercury Vapour burner, the rays of light from which are mixed with those emitted by the lamps shown in front of it.

The bent stem seen at the side is for tilting and lighting the burner and the cord is for pulling the Silk blind down and holding it in position.

These apparatus are highly finished and of most handsome appearance.

Fuller particulars are furnished on request.

PRICE, including complete installation in client's own home, Wiring, Fixing of Switches, Plugs, etc., supply of Auto-Transformer and Resistance, Rheostat, etc.

For Alternating Current **£63 0s. 0d.**

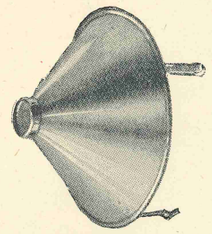
For Direct Current **£52 10s. 0d.**

THE "MERCURAY" QUARTZ BURNER LAMP

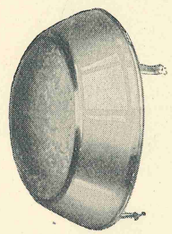
50—250 Volts — FOR DIRECT CURRENT — 50—250 Volts

ENTIRELY CONSTRUCTED IN OUR OWN FACTORY

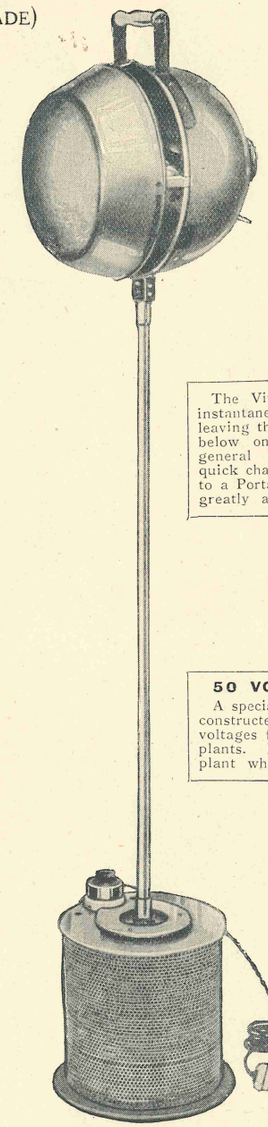
(BURNER ALSO BRITISH MADE)



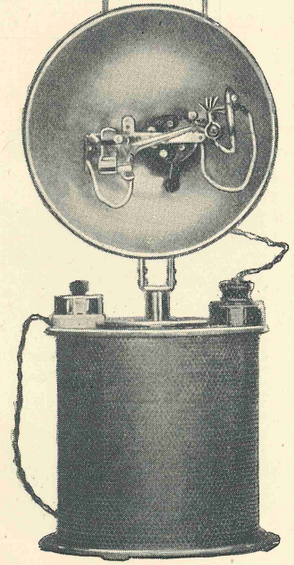
For Medical Use only, the Concentrator Hood, with pure Quartz Compressor Lens, can be instantaneously fitted for local and spot treatment; air gap maintains coolness. Price £2 2s. 0d.



Vitaglass Screen mounted with four clips that spring over the rim of the Reflector Hood. With this screen the Lamp is eminently suitable for Home Use, under Medical Advice.



The Vitaglass Screen is instantaneously removable, leaving the lamp, as shown below on left, ready for general purposes. The quick change from a Stand to a Portable Model is also greatly appreciated.



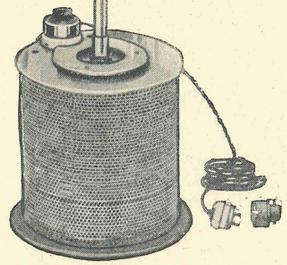
The centre Rod can be unscrewed and the top part of the lamp joined up to the base, making it a Portable Model.

Can be used on all house lighting circuits.

As a Portable Model

50 VOLT MODEL.

A special model has been constructed for use on low voltages for house lighting plants. Mention make of plant when ordering.



As a Stand Model

This apparatus has been primarily designed for Medical Use. It is of best manufacture and first-class finish. The Direct Current Mercury Vapour Burner has an arc of three inches, and generates an ample volume of Ultra-Violet Rays suitable for all treatments.

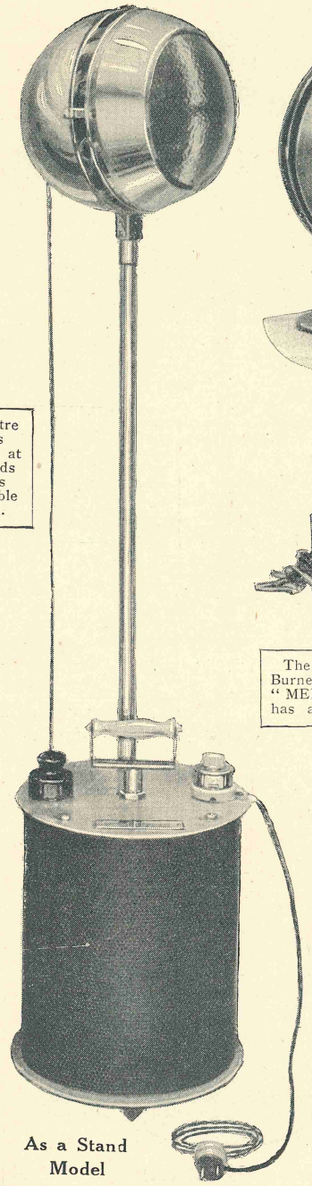
Doctors can freely prescribe it for patients, under their treatment, for use in the home when fitted with the Vitaglass Screen that cuts off the short wave-length rays. With this Vitaglass Screen it is not indispensable to use Goggles.

Price Complete, including Rod and Vitaglass Screen for Direct Current - **£10 0s. 0d.**

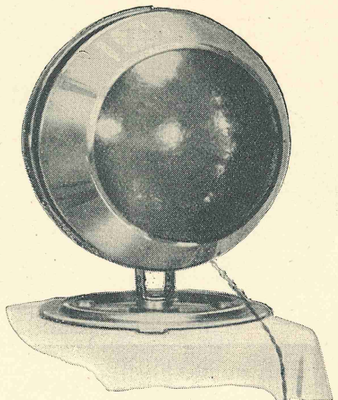
THE "MERCURAY" QUARTZ BURNER LAMP

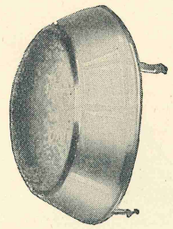
100—250 Volts — FOR ALTERNATING CURRENT — 100—250 Volts

COMBINED STAND AND PORTABLE MODEL



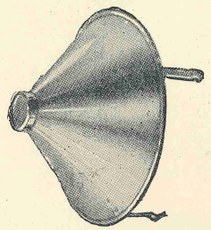
The centre rod is threaded at both ends and is removable at will.

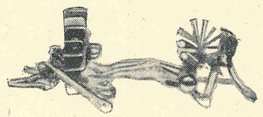




Our own Exclusive Design and Manufacture

This is the Vitaglass Screen that serves for long exposures or for Home use when prescribed. It is instantaneously removable.





Above illustration shows the Concentrator Hood and pure Quartz Compressor Lens that fits on the Lamp. It is fixed with four spring clips. Price £2 2s. 0d.

The Mercury Vapour Quartz Burner that is used in the "MERCURAY" Lamp; it has an arc two inches long.

The "MERCURAY" Lamp shown on the right is the Portable Model. The head part with Burner can be placed in any convenient position on a table or chair.

As a Stand Model

The "MERCURAY" Lamp here illustrated is of the same construction and design as that for Direct Current (see page 73), excepting that the handle is fixed to the lower part instead of to the hood, making it more convenient for carrying the Auto-Transformer.

As illustrated, the Burner has an arc of 2 inches, making quite a powerful although small and compact generating unit. It has a wide range of use for all medical purposes, and can be prescribed for use in the Home with the Vitaglass Screen. Special Auto-Transformer for 25 cycle periodicity £2 10s. extra.

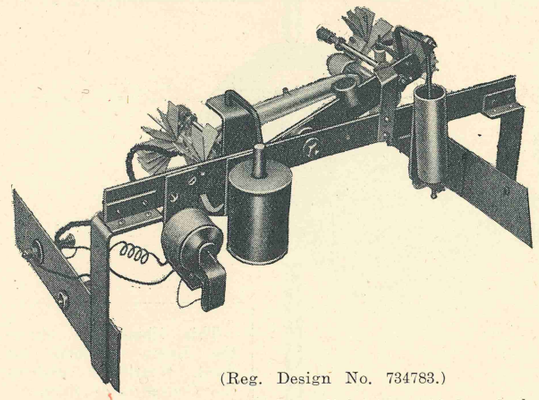
Price Complete, including Rod and Vitaglass Screen for Alternating Current **£18 0s. 0d.**

"AJAX" PATENT ACCESSORIES

FOR

MERCURY VAPOUR "U.V.R." LAMPS

AUTOMATIC STARTER.



(Reg. Design No. 734783.)

ELECTRICALLY CONTROLLED TILTING APPARATUS.

When the current is switched on the Burner immediately tilts and strikes the Arc.

As shown on the illustration the Quartz Burner is carried on a basculating arm that pivots in a ball bearing fitted in the framework.

When the current is switched on an electro-magnet becomes active and exercising a pulling effect tilts the burner just sufficiently for it to strike the arc; if by chance the arc is not immediately struck the tilting process automatically continues until it does.

The life of the burner is considerably increased because there is no shock; the return movement of the burner to its normal position is controlled by the air cushion of the dash pot shown on the right of the illustration.

This fitment is thus doubly useful inasmuch that the tilting by hand which is very exasperating when the burner is difficult to light is avoided and the life of the burner greatly increased through the evenness and smoothness of the tilting process.

When the tilting is done by hand there are the two operations of switching on the current and the actual tilting process; with this invention, the simple switching on of the current covers both operations.

It can be fitted to all Mercury Vapour Lamps.

PRICE FOR "AJAX" LAMPS - - **£6 6 0**

PRICE FOR ALL OTHER MAKES - **£7 7 0**

The "Ajax" Air-Cooling System for Mercury Vapour Lamps.

(Patent applied for).

SUITABLE FOR ALL MAKES AND TYPES.

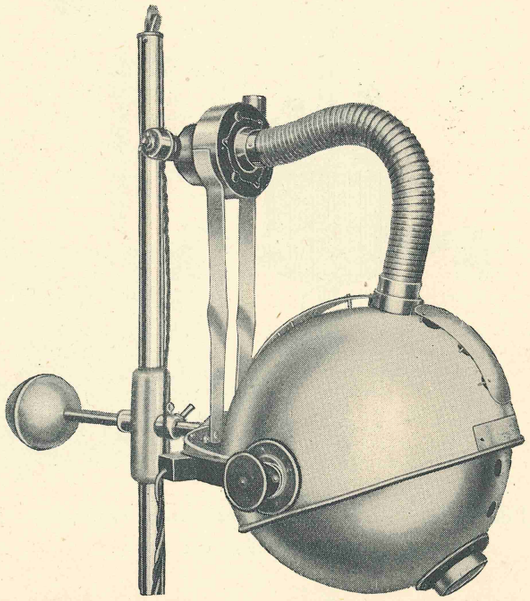
All air cooled Mercury Vapour Lamps overheat *with the hoods closed* for local or spot treatment and it is seldom possible, even with the Rheostat on "weak," to give such treatment for more than three to five minutes without opening the hoods for cooling.

There do exist Water-cooled Units which are connected to the water supply and self-contained *forced* air-draught cooling apparatus, all of which are not only expensive but have certain drawbacks such as leaking of water, etc., and that is why this new "AJAX" accessory has been so enthusiastically received. It can be adapted to all Mercury Vapour Lamps and is removable at will.

The functioning is based upon the fact that hot air rises: a small electric suction fan is placed *above* the Lamp to the hood of which is taken a flexible tubing with a friction tight fitting nozzle, and immediately upon switching on the suction fan, all the hot air is extracted from within the hoods as fast as it is created and not only is the burner kept perfectly cool, but the surrounding atmosphere is purified by the ozonated hot air.

By means of this accessory apparatus these Lamps can be used even *all day long* with the hoods closed.

We desire to acknowledge our indebtedness to E. F. C. Dowding, Esq., M.R.C.S., L.R.C.P., for his suggestions concerning the advisability and necessity for an efficient air-cooling system for these Lamps.



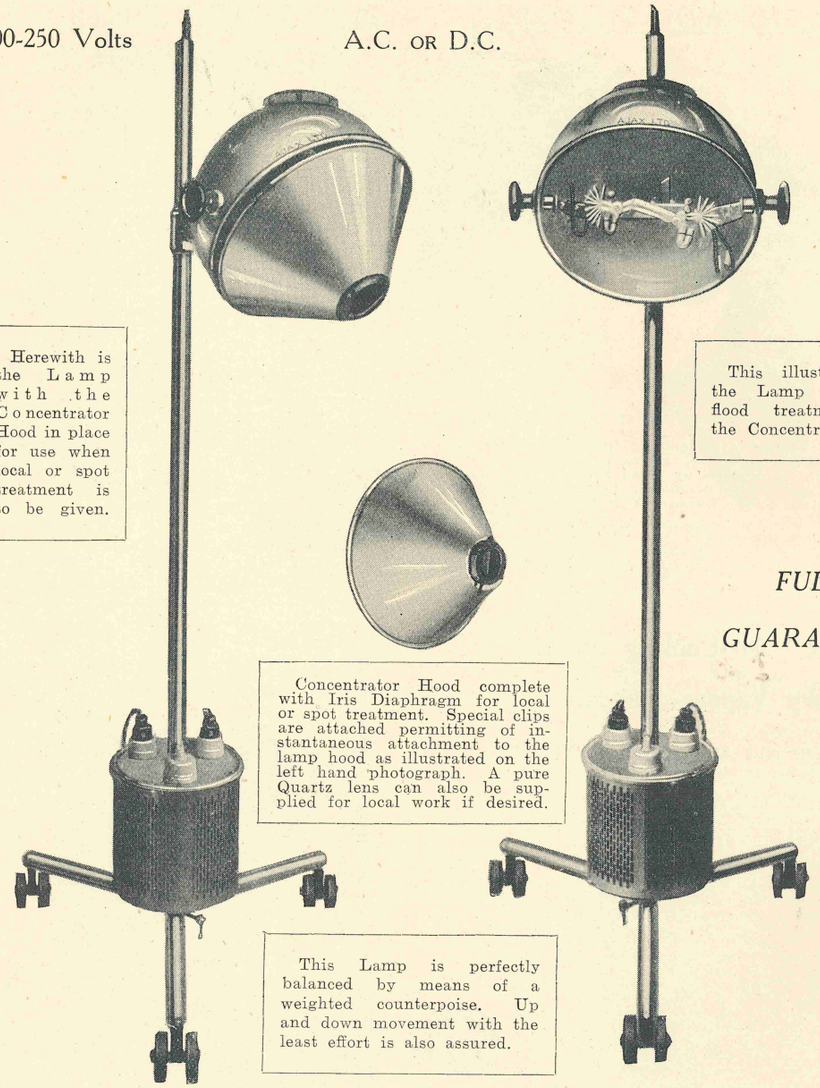
PRICE COMPLETE FITTED TO AN "AJAX" LAMP - - - **£4 4 0**

FOR ALL OTHER MAKES - - - - - - - - - - **£4 10 0**

"THE NEW STANDARD"

MERCURY VAPOUR QUARTZ BURNER LAMP

100-250 Volts — A.C. OR D.C. — 100-250 Volts



Herewith is the Lamp with the Concentrator Hood in place for use when local or spot treatment is to be given.

This illustration shows the Lamp arranged for flood treatment without the Concentrator Hood.

Concentrator Hood complete with Iris Diaphragm for local or spot treatment. Special clips are attached permitting of instantaneous attachment to the lamp hood as illustrated on the left hand photograph. A pure Quartz lens can also be supplied for local work if desired.

This Lamp is perfectly balanced by means of a weighted counterpoise. Up and down movement with the least effort is also assured.

FULLY GUARANTEED

For Direct Current complete with resistance, powerful Quartz Burner, flexible leads, plugs, etc. **£22 0 0**

For Alternating Current complete with Auto-Transformer, double pole burner, leads, plugs, etc. **£37 10 0**

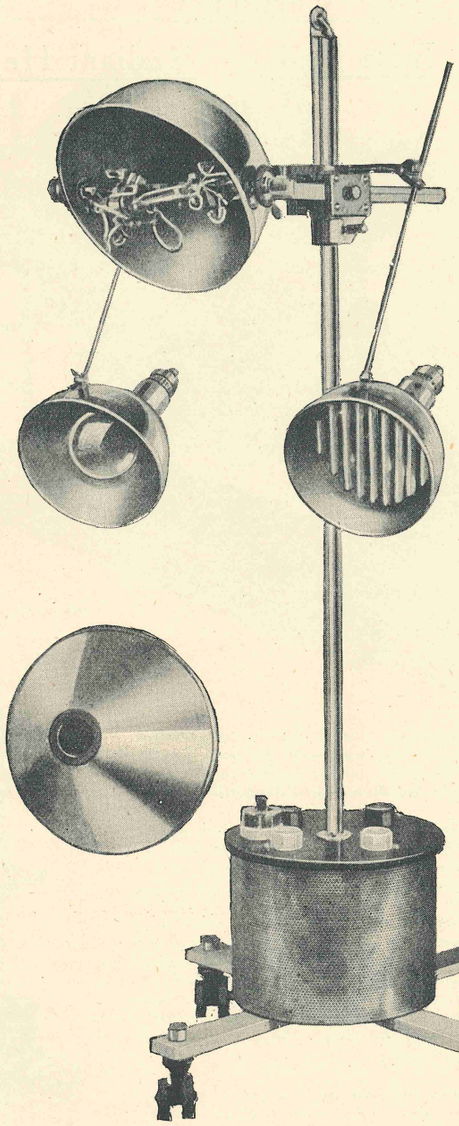
THE AJAX "TRIARAYE" ACTINIC LAMP

ULTRA VIOLET — INFRA RED — RADIANT HEAT

ALL VOLTAGES

In the upper hood, which can be tilted to any angle, is shown the powerful Mercury Vapour Burner for Ultra-Violet Irradiation.

This Reflector Hood is shown fitted with a Radiant Heat Lamp which is interchangeable for an Infra Red Generator as shown on the opposite side.



FOR DIRECT OR ALTERNATING CURRENT

The Infra Red Generator here shown is of new design and particularly rich in the emission of these Rays. The parallel Quartz tubes radiate over a large area. Can be placed at either side of the apparatus at will.

The Concentrator Hood here shown fits over the upper hood of the Mercury Vapour Lamp with spring clips. It has an Iris diaphragm and is supplied with a pure Quartz Compressor Lens and Ultra-Violet Ray Filter for Local and Spot treatments and Quartz Applicator work.

ENTIRELY BRITISH MADE IN OUR LONDON FACTORY

Every possible movement is provided for in this apparatus and all three lamps can be placed at any height, at any angle, and in fact in any and every position that may be required.

See illustrations overleaf.

AN IDEAL TRIPLE PURPOSE APPARATUS

Price Complete. For Direct Current **£37 10 0** For Alternating Current **£50**

THE AJAX

"TRIARAYE" ACTINIC LAMP

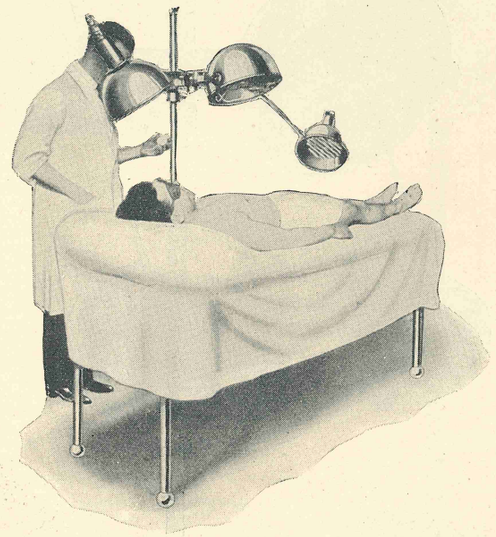
Combined

Ultra Violet — Infra Red — Radiant Heat Apparatus

The illustration herewith shows complete immersion treatment being given.

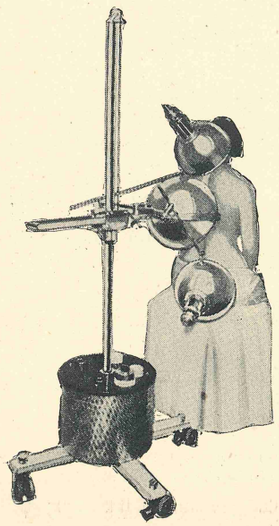
All three generators can be brought independently one of the other to any position desired and at any angle.

The Mercury Vapour Ultra-Violet Ray Generator is contained in the middle largest hood which can be tilted as required.



The Radiant Heat Lamp on the left throws glowing warmth over the patient.

It will be seen that the Infra Red Ray Generator on the right is at a considerable distance from the apparatus itself, but this is provided for by the long arms fixed with a special swivelling movement. The interchangeable Radiant Heat and Infra Red Lamps are fitted to a common arm which is detachable from the apparatus.

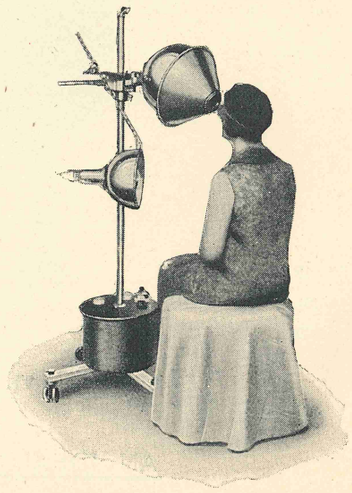


The illustration on the left demonstrates the facility with which the three Lamps are placed in any position desired, at any height and at any angle.

The crossbar supporting the whole moves horizontally on roller bearings with a small fixing screw that holds it in position.

Whereas in the illustration above the three Lamps are in a horizontal plane, they are here shown placed vertically. The illustration on the right shows local treatment of the face being given, but the Infra Red Lamp has been detached, leaving the Radiant Heat to keep the patient warm.

The apparatus as a whole is mounted on four double castors giving perfect freedom of movement.



(See preceding page for Price, etc.)

ULTRA VIOLET IRRADIATION

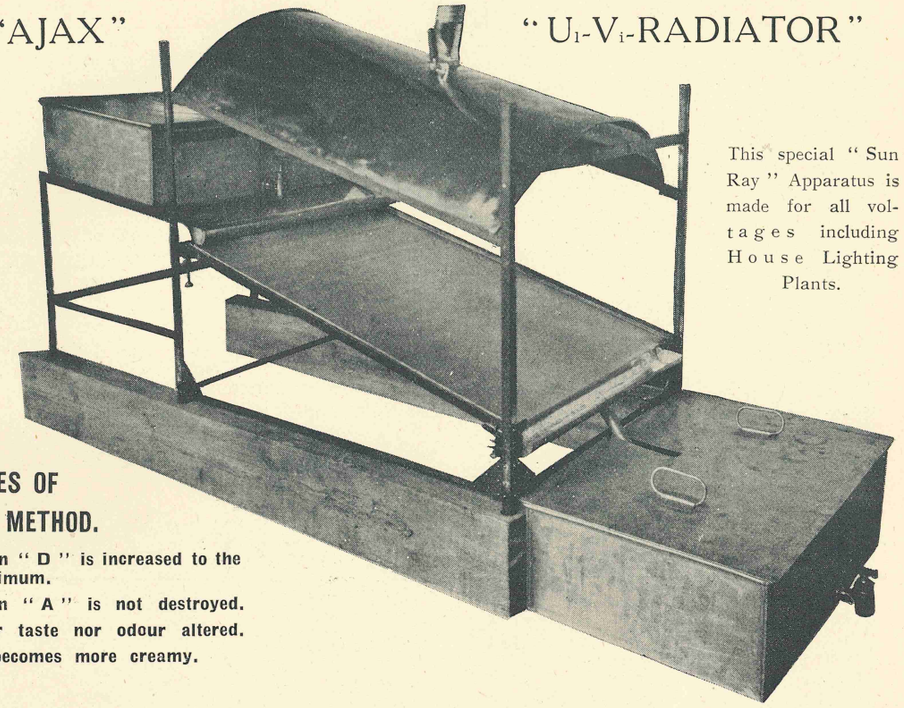
OF

MILK

NEW PATENT PROCESS

THE "AJAX" "U_I-V_i-RADIATOR"

Entirely British made. Completely constructed in our own factory.



This special "Sun Ray" Apparatus is made for all voltages including House Lighting Plants.

SPECIFIC ADVANTAGES OF THIS NEW METHOD.

1. **Vitamin "D" is increased to the maximum.**
2. **Vitamin "A" is not destroyed.**
3. **Neither taste nor odour altered.**
4. **Milk becomes more creamy.**

(Provisional Patent No. 18040/28. Incorporates other Ajax Patents and Registered Designs).

It is definitely established that Vitamin "D" in Milk is immensely improved by Ultra Violet (Artificial Sunlight) Irradiation.

The "Ajax" "Ul-Vi-Radiator" procures all the benefits, *preserves* Vitamin "A" and does not affect the appearance, taste or odour.

The apparatus as a Unit, as shown on illustration, has two 10 gallon tanks, the one empties itself into the other down a chute of prismatic glass that is subjected to Ultra Violet Rays from a Mercury Vapour Burner beneath the Parabolic Reflector.

Whilst turbulence is avoided, the passage down the chute is in short waves, thinning out at the crest and thus the Milk, in its entirety, is completely irradiated and also incidentally is **sterilised** at the same time.

Multiple Plant of a varying number of Units is made according to the volume of Milk to be irradiated.

A screen is interposed between the Mercury Vapour Burner and the Chute that eliminates Heat and certain other Rays that are harmful to Vitamin "A."

We manufacture special Ultra Violet Irradiation (Artificial Sunlight) apparatus for Horses, Cattle, Poultry, etc.

Price Complete, capacity 25/40 galls. per hour for D.C. ... ... **£52 10 0.** For A.C. **£65 0 0.**

Price Complete, Multiple Plant, capacity 300/500 galls. per hour for D.C. **£500 0 0.** For A.C. **£600 0 0.**

EFFECT ON MILK AND MILCH COWS

Reprinted from The Daily Telegraph

29/6/28.

SUN RAYS IN MILK NEW TREATMENT TO PREVENT RICKETS

. . . . . .

"Provided . . . milk is of a certain minimum quality of fat and solids, it can be sold in this country in competition with the most hygienically treated and carefully bottled product."

In a paper on "Activated Milk," Dr. Wilhelm Hoffman, of Vienna, said that milk treated with ultra-violet rays had proved, in tests made by famous Austrian professors, its efficacy both as a preventative of rickets and as a cure.

Experiments showed, he declared, that animals suffering from rickets became quite healthy after being fed for four weeks with ray-treated milk, while animals fed on milk not ray-treated, either died or did not quite recover.

"Milk," he added, "is a food which is both cheap and easily digested, and can, therefore, be taken in sufficient quantities by everyone. From a prophylactic point of view the sale of a cheap activated milk to the masses is even more important than the direct treatment of the human body with artificial sunlight, since this treatment cannot be as universal as the consumption of an activated milk."

"SUN RAYS" EQUALLY GOOD FOR COWS

Reprinted from Electro - Farming

January, 1928.

One of the latest developments on the electrified farm is the use of ultra-violet lamps for treating farm stock. During the past few years the Rowett Research Institute of Aberdeen have conducted a series of valuable experiments to determine the effect of irradiating lactating animals. When a cow is in full milk, she draws upon the calcium store in her own skeleton, and in the case of heavy milking cows this loss may prove serious. As a result of the Institute's experiments it is now known that by irradiating the cows with ultra-violet rays it is possible to reduce the loss of calcium and phosphorus from the body, and in some experiments it was even found that the loss can be converted into a gain. The prevention of this loss during the lactation period will probably increase the period of maximum yield, and, at the same time, safeguard the health of the cow. There is no doubt that the ultra-violet treatment is beneficial during the winter months, as it is at this time of the year when the cows are deprived of the health giving rays of the sun. A firm of manufacturers is now producing a lamp specially designed for the treatment of cows.

All "SUNLIGHT" (Ultra Violet Irradiation) Apparatus manufactured by us are specially designed for their particular use including Medical, Dental and Veterinary Treatments, Commercial and Industrial purposes, for Tonic treatment of Farm Animals, Poultry, etc.

Ajax "Sunlight" Portable Apparatus in use

The illustration shows the water-cooled quartz concentrator in use in conjunction with the "Ajax" Portable Arc Lamp. A continuous circulation of water on the thermo-syphon principle keeps the rays perfectly cool. It will be noticed that in this instance the lamp is being used from the ordinary house lighting circuit.

The "Ajax" Portable Automatic Arc Lamp.

Polimetallic, Tungsten, Iron and Nickel Cored and Impregnated Carbons

This apparatus, which is a generator of Ultra Violet Rays in considerable volume and strength, is particularly suitable for Medical men for use both in their own and patients' homes. It is exceedingly useful also from a practical point of view because it will function equally well on Alternating or Direct current and it can be used on most house electric lighting circuits, *for all voltages*.

The functioning is absolutely automatic and the Arc burns perfectly steadily and noiselessly.

Both moving in their own planes, the top carbon is vertical and the lower carbon horizontal, which latter position gives the immense advantage of throwing the rays out in a horizontal direction without the aid of a reflector, whereas if both carbons are vertical more than half the rays dissipate and are lost behind the arc.

It is not of the same power as the Mercury Vapour Quartz Burner lamps, but in its own sphere it is equally efficient.

It will not set up a violent Erythema, upon the uselessness of which much could be written and it requires longer exposure and can be applied at much closer range, in fact, as near to the patient as the heat allows.

The spectrum-photograph of the Polimetallic Carbon Arc shows closely packed lines over the whole range of useful rays, that is from 2,400 Ångstroms to 3,000 Ångstroms with particular strength round the vital point of 2,500.

Impregnated and carbons specially cored with various metals—Tungsten, Iron, Nickel, etc.—are supplied to order, but none have been found to equal the "Ajax" Polimetallic carbons which are made with a mixture of some half-dozen different salts and metals, etc., in varying proportions and of precise molecular value in order to obtain the greatest and most efficient output of Ultra Violet Rays possible.

Particularly in the treatment of certain cases the use of this Ultra Violet Ray generator is not only the most appropriate means, but the results obtained are often far superior than with any alternative method.

A great feature is that it is practically fool-proof and that over-exposure is not particularly dangerous.

As a basis for the treatment with this Unit, the exposures can last on an average for 12 minutes at a distance of 12 inches. The minimum distance is the closest point at which the patient can stand the heat emitted from the arc and the length of time of exposure is reduced accordingly to a minimum of three minutes.

For complete immersion of the body, say, at 2 feet from the arc, 20 minutes' exposure can be given.

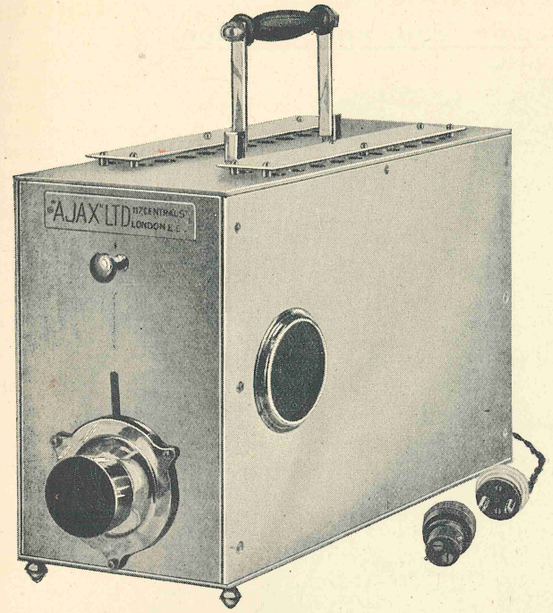
Instructions for use of these apparatus will be found on page 63.

The Tungsten Arc gives a greater volume of Ultra Violet Rays than the various carbons, but it has a disadvantage that it cannot be used on Alternating current.

Shorter exposures are given with this apparatus which is particularly useful for Spot treatment.

There are three portable apparatus, the **Carbon Arc,** the **Tungsten Arc** and the **Combined Model,** which latter is especially favoured for its greater scope; the Tungsten Arc part is detachable and a Water-Cooled Quartz Concentrator and Compressor Lens is supplied for the Carbon Arc.

"AJAX" PORTABLE AUTOMATIC POLIMETALLIC CARBON ARC LAMP



Front View.

This apparatus has met with the approval of a large number of medical men who desire to be able to administer "SUNLIGHT" (Ultra-Violet Irradiation) treatment in their patients' own homes.

It requires a current of 8 amps; it is possible to use it on almost any house lighting circuit.

It is suitable for all voltages and either alternating or direct currents.

The appearance is neat, and it is of highest class manufacture, being constructed in our own London Works.

The automatic functioning and resistance coils are placed in the interior; view window at the side for examination of the arc.

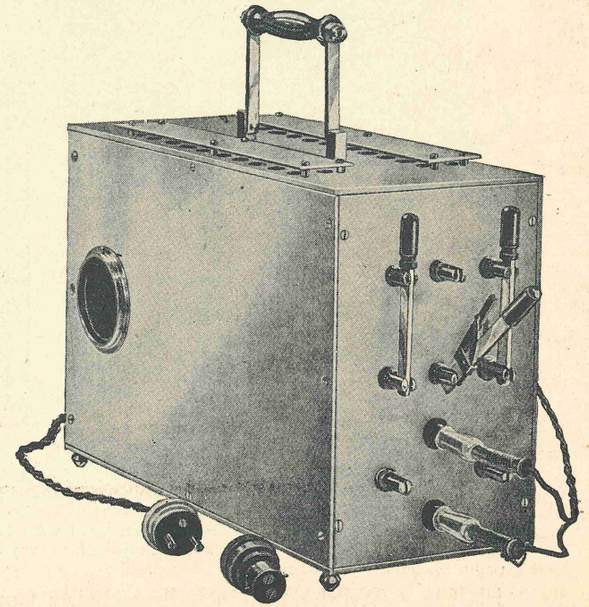
PRICE - **£12 12s. 0d.**

The front plate of the apparatus is removable for giving general or flood treatment.

The Iris diaphragm as shown is suitable for local or spot treatment.

A water-cooled Quartz Concentrator and Compressor (shown on illustration, page 86) can be supplied with this apparatus at an extra cost of £4 4s. 0d.

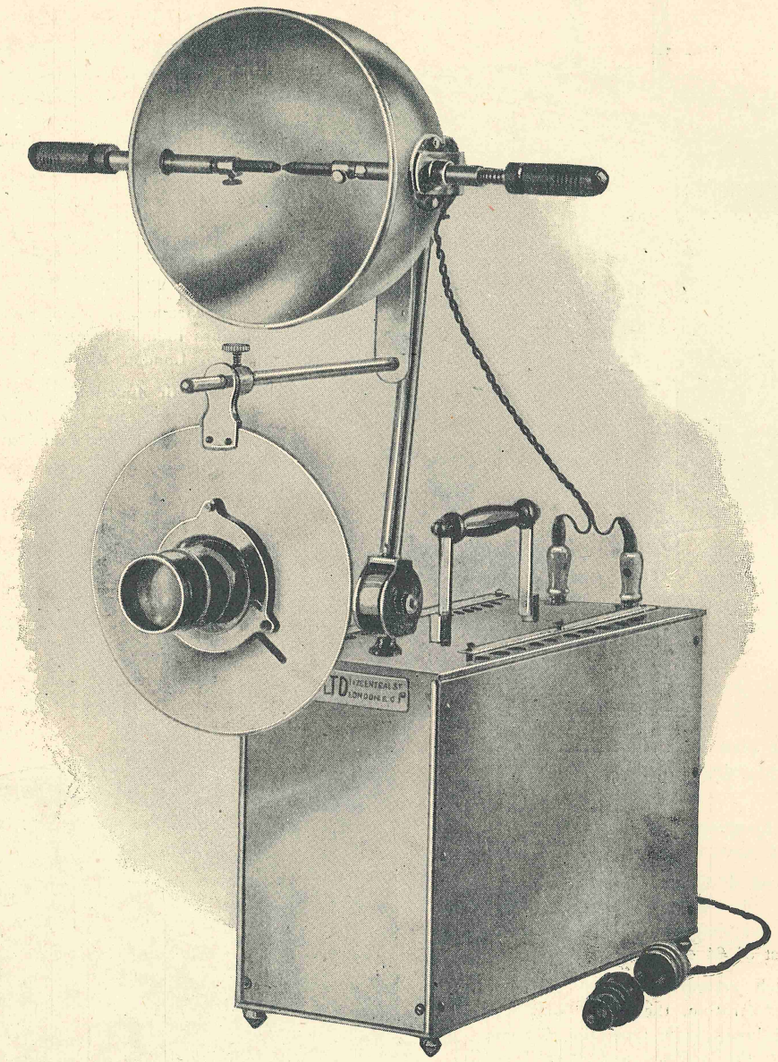
The switch arrangements are shown in the lower illustration, the middle one being of the quick-break knife type, the side ones for varying the voltage and "on" and "off" for the magnetic Blower, which considerably increases the arc in volume, giving it greater intensity when required.



Back View.

"AJAX" PORTABLE TUNGSTEN ARC
With QUARTZ CONCENTRATOR

Adjustable to any angle and any position.



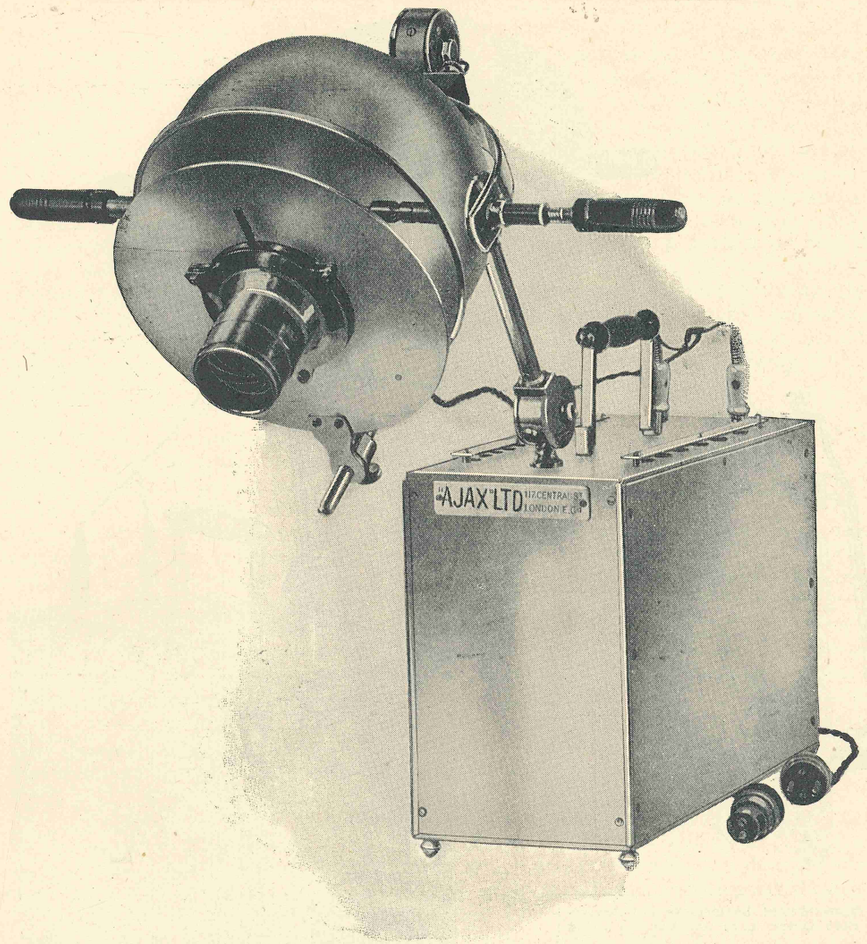
This model Ultra-Violet Irradiation Lamp has been established owing to the demand for a powerful portable apparatus. The casing forming the lower part contains the Resistance Coils, with quick-break knife switch at the back and adjustable voltage switch. (The lower illustration on page 83 shows the arrangement of the switches.) The Burner itself is of instantaneous lighting, hand adjusted. With front screen fitted with Iris diaphragm and Quartz Concentrator. The whole of the upper part can be adjusted to any angle as shown on the illustration on page 85, and it is immediately detachable.

PRICE, COMPLETE, including Quartz Concentrator and Iris Diaphragm,

£14 10s. 0d.

"AJAX" PORTABLE TUNGSTEN ARC

Adjustable to all positions.



The illustration is of the same apparatus as on page 84, but showing that it is adjustable to any angle.

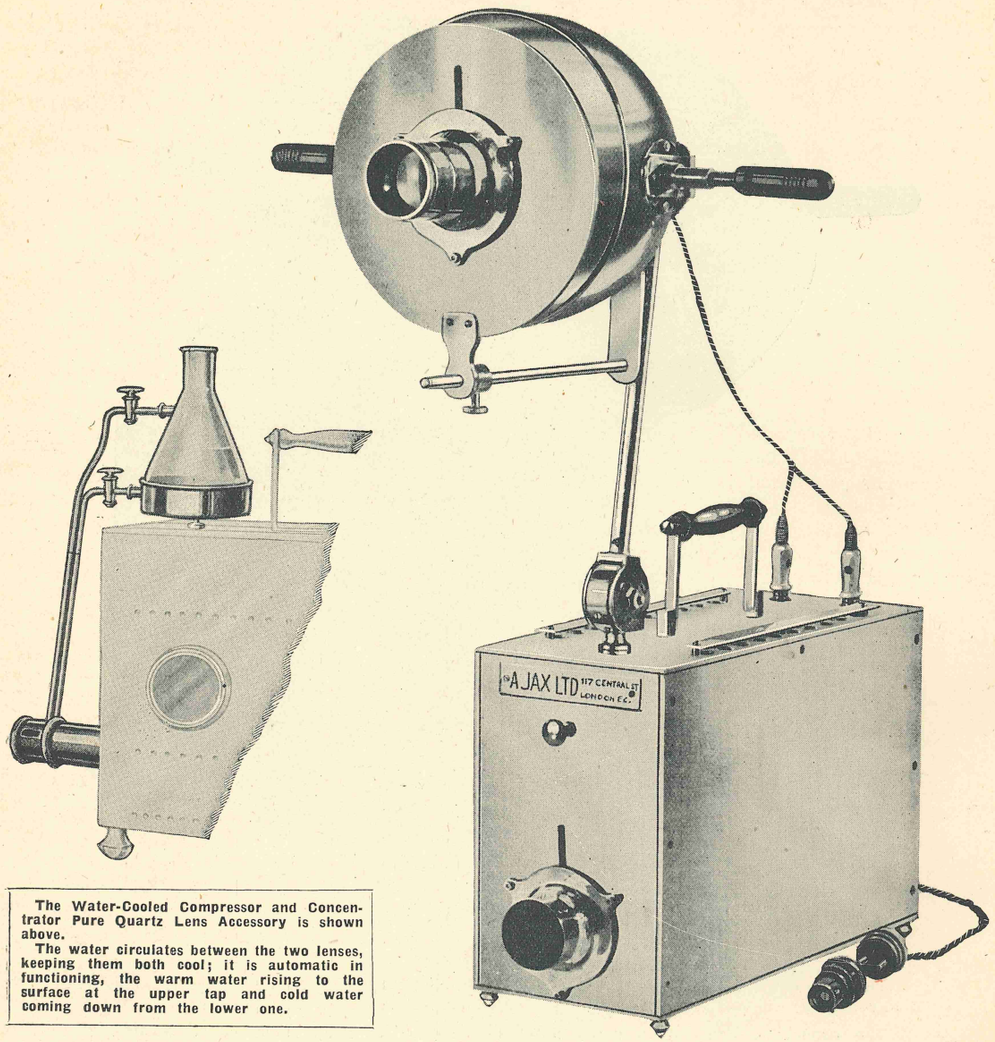
The supporting arm has a patent joint at each end that holds fast when pushed into position without other clamping devices. The front screen is here placed before the Arc and shows the Iris diaphragm and Quartz Concentrator ready for Local or Spot Treatment. It will be seen that an air-gap is arranged between the Arc and the screen to prevent over-heating. When desired a special leather case can be provided suitably arranged to take the upper and lower parts which are immediately detachable.

Of handsome appearance, the apparatus is of the soundest manufacture and design. Aluminium is the predominating metal, the other metal parts being Nickel Plated and highly polished.

PRICE COMPLETE - - - - - - - **£14 10s. 0d.**

"AJAX" COMBINED PORTABLE

TUNGSTEN ARC BURNER AND AUTOMATIC POLIMETALLIC CARBON ARC LAMPS



The Water-Cooled Compressor and Concentrator Pure Quartz Lens Accessory is shown above.

The water circulates between the two lenses, keeping them both cool; it is automatic in functioning, the warm water rising to the surface at the upper tap and cold water coming down from the lower one.

The high-power Ultra-Violet Irradiation of the Tungsten Arc Lamp is often required in certain cases, whilst the Polimetallic Carbon Arc, with which much longer exposures can be given, is considered to be preferable in many other treatments.

This combined apparatus enables the Practitioner to have a much wider scope in Actino-Therapy.

Iris diaphragms are supplied to both parts, and a Quartz Concentrator for the Tungsten Arc and a water-cooled Quartz Concentrator for the Carbon Arc. The water-cooled Quartz Concentrator is shown on the illustration on the left; the lenses are cut from rock crystal, purest natural Quartz. The water-cooling is effected on the Thermo-syphon principle.

PRICES COMPLETE (With water-cooled Compressor and Concentrator Pure Quartz Rock Crystal Lenses) **£21 0s. 0d.**

Reprinted from "THE LANCET," *March 26th*, 1927.

The "Ajax" Portable Arc Lamp.

The lamp which has been submitted to us is designed as a portable source of ultra-violet radiation to be taken to the patient's house and used on the ordinary house mains. Such a lamp must obviously be of reasonable size and weight, simple to use, and capable of running on any voltages direct or alternating. The instrument submitted consists of a strong metallic case, about the size and shape of a large attaché case, heavily nickel-plated, which contains a small automatic arc and the necessary resistances. The arc itself is permanently mounted at one end of the case and is not intended to be removed when in use. This makes for safety in handling and for simplicity, as the minimum of fitting-up is required. The end facing the arc forms a sliding panel which can be completely withdrawn when a wide-angled beam, suitable for the irradiation of a large area, is required. For localised treatment, the sliding front carries a diaphragm and a water-cooled chamber fitted with rock crystal windows. The water cooling is effected by a glass reservoir on the top of the instrument, convection currents causing the water to circulate between the reservoir and the water chamber. This simple arrangement was found to be quite effective for the short period required—in ten minutes the temperature of the water had risen only 7°C., whilst the quartz lens, though warm, was not uncomfortably hot.

The arc is formed between cored carbons, either tungsten-cored or so-called polymetallic, the latter being cored with a mixture of metals designed to give intense radiation in the region of most therapeutic value. On the back of the instrument three knife switches are fitted. One is the main switch for the arc, the second has two positions corresponding to main voltages of 220 and 110 respectively. The instrument is sufficiently flexible to allow of its use on other voltages varying within 10 per cent. of these values. The third switch allows the use of the magnetic blower which is fitted to the arc; this is an electro-magnet which forces the arc forward in the form of a flame when in use and thereby increases the output of radiation. The main switch has two contacts, one controlling the arc in the case and the second switching the current to a second arc which is mounted in a hood-shaped reflector carried at the end of an adjustable arm attached to the top of the case. This arc can be used with a rock crystal lens applicator as described above, but in this case, no cooling device is fitted, the heat not being so intense as for the internal type.

The instrument takes about eight ampères of current, and was found on test to give a very steady output. The case tended to get hot during a prolonged run but, owing to the efficient ventilation of arc and resistances, no damage was detected. The radiation from the bare arc and also after it had passed through the applicators was examined with a Hilger quartz spectroscope. The spectra extended as far as 2100 Ångstrom units and the quartz lenses were found to be transparent over the whole range. The polymetallic carbons gave a spectrum of closely packed lines over practically the whole range. A few minor points of design—*e.g.*, the disposition of the switches on the case, call for slight modification, but they are by no means important and are already receiving the attention of the manufacturers.

In general, the "Ajax" lamp seems to be very well designed for its purpose—namely, to provide a portable source of ultra-violet rays which can be used over a wide range of varying conditions and for a number of different purposes.

ARTIFICIAL SUNLIGHT TREATMENT

(ULTRA VIOLET RAY).

THE NEW "SUNVIRAY" LAMP.

The Lamp illustrated on opposite page is intended for use in mild cases and particularly for the utilisation of these Health-Giving Rays for their tonic effect.

The apparatus is British made in our own factory.

Whilst extremely well finished, is strongly and soundly made.

It is guaranteed for Five years.

It is supplied with a Rotary switch at the base, which ensures safety, and separate plug holes are provided for the different voltages, 110 and 220, each of which gives a wide margin for other voltages.

When switching on the current, the Arc is immediately struck and the burner will function automatically until the Carbons are burned out.

Each pair of Carbons will last for about two to three hours.

The workmanship and finish of the whole apparatus rival that of those costing ten times as much.

The top plates of the Resistance Unit are of Aluminium, highly polished. The base is also of Aluminium.

The upright stem is nickel-plated and polished as well as the upper Reflector hood; the whole presenting a very handsome appearance.

The Lamp is constructed to consume current of 4 to 5 Amps, and therefore can be used on any house-lighting circuit.

It should be used on the Power circuit when this latter is available.

It consumes but One Unit per hour, and thus the cost of running it is negligible.

The Lamp does not overheat and a special cooling device is arranged over the resistance unit by which there is free circulation of air for cooling purposes.

The radiation spreads in such manner that at 2 ft. distance from the Lamp the whole of the Trunk is well covered, and slightly farther away the whole Body and Limbs come well within range.

The greatest expanse possible of the skin should be exposed to the Rays, because it is only by the penetration of the Rays into the skin that beneficial results are obtained.

To be able to direct the Rays where required, the top part is provided with a hinged-up-and-down movement.

This is the Guarantee given with the "Sunviray."

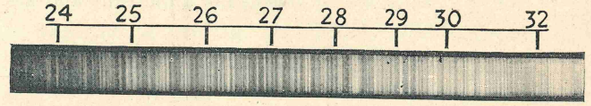
"SUNVIRAY"

(Reg. Trade Mark No. 479543)

Guarantee.

AJAX "SUNVIRAY" Lamp No..... *Date*.....

is hereby guaranteed *to be in exact accordance with our printed description of it and for a period of Five Years against any constructional defects and also that the Arc will generate Ultra-Violet ("Sunlight") Rays exactly as shown on the Spectrum photograph (by B. D. H. Watters, M.Sc., with Hilger quartz spectroscope on a Panchromatic plate) herewith reproduced.*



Issued by

On behalf of the Manufacturers,

AJAX LTD. (London).

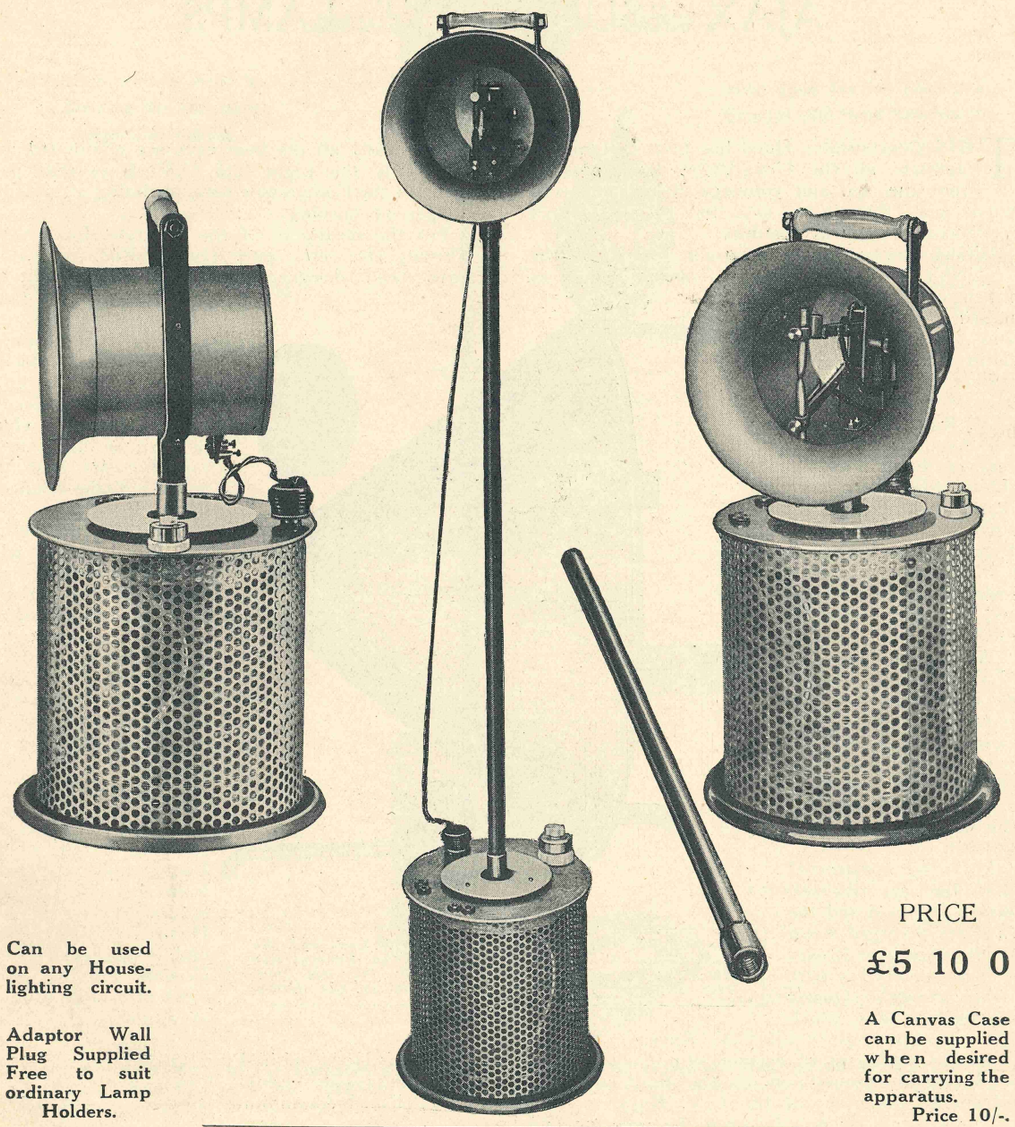
AJAX "SUNVIRAY" ARTIFICIAL SUNLIGHT LAMP.

TUNGSTEN CORED CARBONS. *A New Combined Portable and Stand Model.*

The best **British-made** low-price Lamp yet invented.

AUTOMATIC IN ACTION FOR BOTH ALTERNATING AND DIRECT CURRENTS.

All Voltages from 100 to 250 inclusive.



Can be used on any House-lighting circuit.

Adaptor Wall Plug Supplied Free to suit ordinary Lamp Holders.

PRICE

£5 10 0

A Canvas Case can be supplied when desired for carrying the apparatus. Price 10/-.

Illustration on left shows Side View of Portable Model.
In the middle, as a Stand Apparatus, instantaneously dismountable.
On the right, Front View and Rod for Converting into Stand Model.

CONCENTRATOR HOOD & COMPRESSOR QUARTZ LENS

AND

QUARTZ ROD APPLICATOR

FOR

AJAX "SUNVIRAY" LAMPS

THIS Concentrator Hood has been designed to captivate all the Ultra-Violet Rays possible from the Arc and converge them to a confined area, that is to say, for Local or Spot treatment of various troubles.

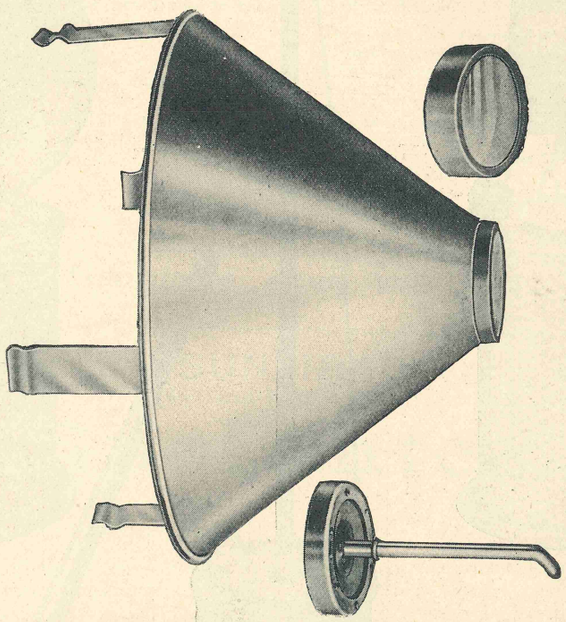
Whilst the curative and tonic effects of the "SUNVIRAY" Lamps are obtained by as much exposure of the naked body as possible and the closer to the lamp the better the results, it is still necessary to concentrate the U.V. Rays as much as possible on to the actual seat of the trouble for the treatment of a large number of complaints such as Boils, Alopecia, Pyorrhœa, Abscess, Chilblains, Furunculosis, Ringworm, Sycosis, Ulcers, Wounds, etc.

With this hood the U.V. Rays are brought to bear exactly where required at the closest range possible, that is, within six inches from the arc where the Rays are generated and all the short Rays are thus utilised.

It is so constructed that the arc is well inside the hood and the rays are diverged down to the mouth of it over which is placed a pure rock crystal Quartz Compressor lens, which gives free passage to all U.V. Rays.

In the treatment of certain skin troubles, this lens can be pressed on to the flesh and full advantage taken of all the U.V. Rays.

There is an air gap between the reflector and concentrator hoods of the lamp that allows the heat to dissipate and there is a big cooling surface also on the concentrator hood itself.



The Caps in which are fixed the Quartz Lens and the Quartz Rod fit over the mouth of the Concentrator Hood. The spring metal straps on the left snap over the rim of the Reflector Hood of the Lamp.

Practically all the heat rays are eliminated and it is only the Light and U.V. Rays that pass through the Compressor lens, obviating all possible danger of burning.

For the treatment of the Cavities—Ear, Nose, Throat, etc., etc., pure Quartz Rod applicators have been designed and also others suitable for Dentists (see page 93).

The rod is mounted in a metal socket which is fitted on to a flexible leather disc to prevent jarring, which in turn is fixed to a cap that fits over the nozzle of the Concentrator Hood.

Our illustration shows the Hood itself with the Compressor lens above and a Quartz Rod applicator below.

The Concentrator Hood fits on to the Lamp with four nickel-plated spring clips that hold it firmly in position; it can be put on and taken off at a moment's notice, at will.

It gives a far greater scope to the use of the Lamp and as apart from its use in the ordinary way in the Home, Medical men find it particularly serviceable for the treatment of a large number of ailments.

Price of Hood with Pure Quartz Compressor Lens, fitted in Polished Aluminium Mount ... **£1 17 6**

Price of Pure Quartz Rod Applicator, mounted with Leather Disc and Holder, as illustrated **£1 2 6**

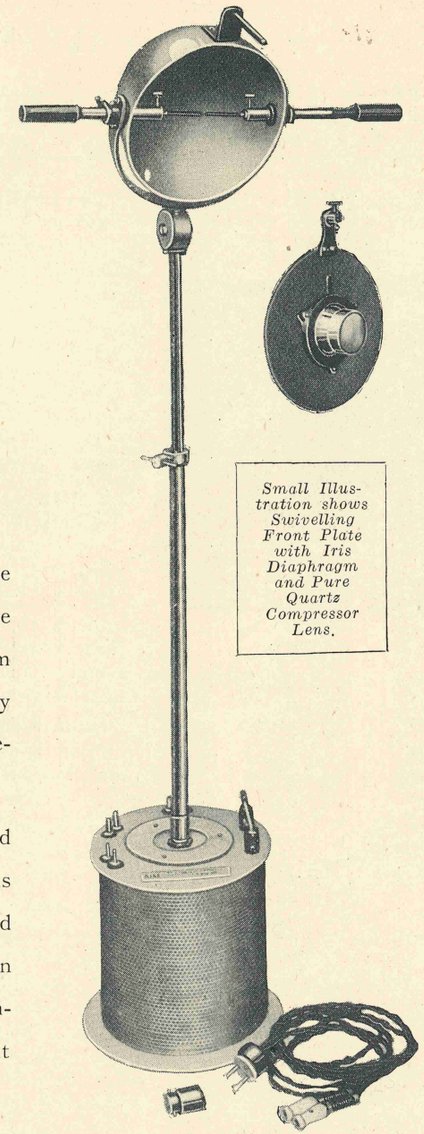
THE "AJAX" TUNGSTEN ARC LAMP

STAND MODEL.

FOR DIRECT CURRENT. ALL VOLTAGES.

Push-in Arrangement for Striking the Arc, with Automatic Release.

The Tungsten Rods are Fitted to Small Iron Holders Eliminating all Waste.



Small Illustration shows Swivelling Front Plate with Iris Diaphragm and Pure Quartz Compressor Lens.

With open Arc for Individual, General and Flood Treatments.

With Screen, Iris Diaphragm and Pure Quartz Compressor Lens for Local and Spot Treatment.

This apparatus can be tilted to any angle by the Ajax patent swivelling arm and adjusted to height by the up and down movement, with fixing screw.

The hood is of polished aluminium and the Arc is centralised by the threaded bars of the handles in which the special "push-in" lighting arrangement is fixed.

An unique feature is the manner of fixing the tungsten rods in small iron holders by which means the tungsten is completely burnt right to the very end, because the iron holder can be burnt away with it until the tungsten is completely consumed.

Two lengths of braided flexible wire are supplied with each Lamp with porcelain terminals.

The advantages of the Tungsten Arc Lamp are many. The extremely rich output of Ultra-Violet Radiations, luminous rays and infra-red rays combine to produce results which cannot be exactly reproduced by any single source. . . .—*Ultra-Violet Rays*, by PERCY HALL, F.R.C.S.

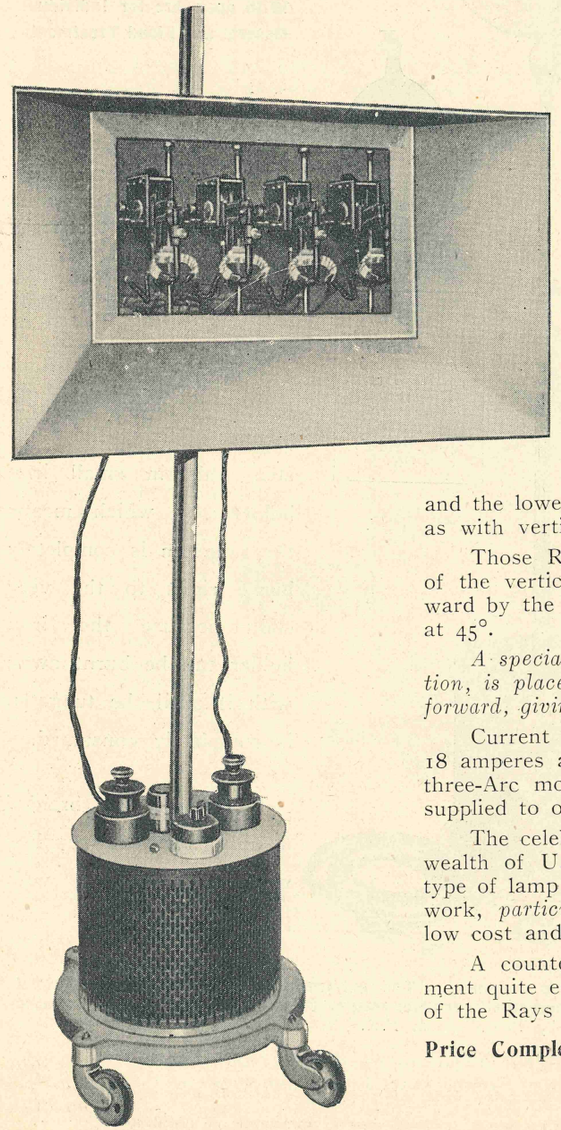
PRICE AS ILLUSTRATED (All Voltages) including swivelling front plate with Iris Diaphragm, pure Quartz Compressor Lens and one pair Tungsten Rods - - - - - - - - - - - - - **£13 13 0**

THE AJAX "QUADRARC" LAMP

FOR COLLECTIVE, FLOOD, AND INDIVIDUAL TREATMENT,
FOUR POWERFUL POLIMETALLIC CARBON ARCS.
TILTS TO ANY ANGLE. ADJUSTABLE FOR HEIGHT.

FOR ALTERNATING CURRENT. ALL VOLTAGES.

ABSOLUTELY AND ENTIRELY AUTOMATIC.



Fitted with an Auto Transformer, this new apparatus with either two, three or four pairs of Polimetallic Carbons is entirely Automatic and self-contained.

The Arcs are wired *in parallel* and there is no wastage whatever of current and each arc is *separately* controlled, ensuring perfect synchronisation and absolute equality of each arc.

It is the best U.V.R. apparatus for Alternating current—nothing to get out of order—nothing to break. No attention required whilst being used and is but of moderate cost.

The carbons are at right angles and all the Rays are thrown forward horizontally both from the Arc itself and the lower carbon; none dissipate behind the arcs as with vertical carbons.

Those Rays thrown downwards from the crater of the vertical carbon are reflected horizontally forward by the lower plane of the reflector hood placed at 45°.

A special Magnetic blower, seen on the illustration, is placed at each arc, which throws the flame forward, giving it greater intensity.

Current consumption on the four-Arc model is 18 amperes and proportionately less on the two and three-Arc models; lower power Lamps of this type supplied to order.

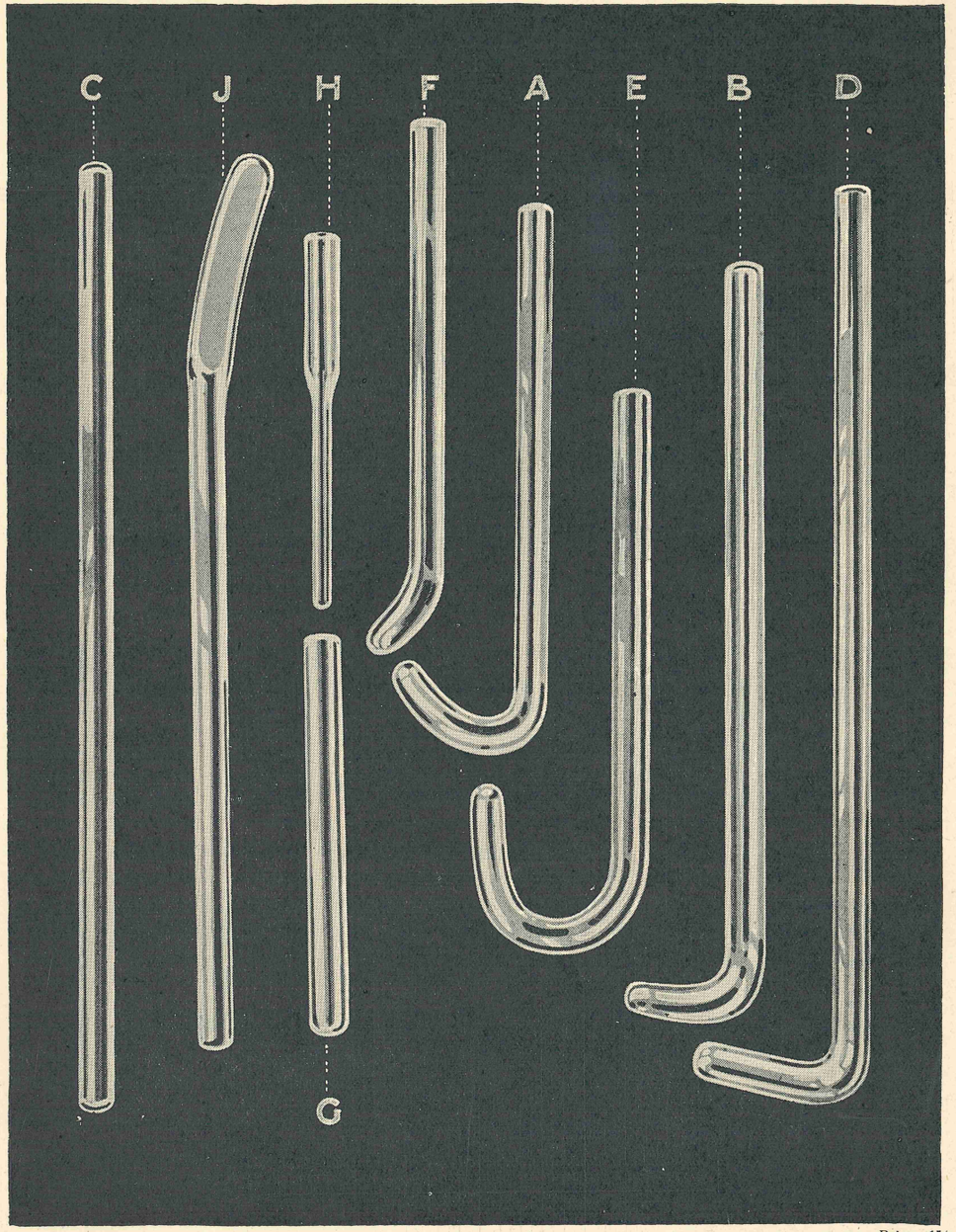
The celebrated Polimetallic Carbons emit a great wealth of U.V. Rays and the practicability of this type of lamp makes it ideal for Hospital and Clinical work, *particularly for alternating current*, being of low cost and economical in use.

A counterpoise makes the up and down movement quite easy and the tilting of the hoods permits of the Rays being thrown at any angle.

Price Complete (Quadrarc) with 4 Arcs **£33 10 0**
(Triarc) with 3 Arcs ... **£26 10 0**
(Duoarc) with 2 Arcs ... **£21 0 0**

PURE QUARTZ APPLICATORS FOR "U.V.R." APPARATUS TREATMENT

For Ear, Nose and Throat and other Cavities, and Special Models for Dentists



A. Tip curved at angle of 45 deg. ... ... Price **15/-**
B. Designed so as to be safe in irradiating post pharyngeal passages. Angle such as to insure maximum utility ... ... Price **17/6**
C. Urethral Cases. Has olive-shaped tip ... ... Price **15/-**
D. Laryngeal and Pharyngeal Applicator, Laryngeal Tuberculosis ... ... Price **19/-**
E. Useful for attacking the buccal aspect of teeth in connection with the treatment of apical infections, Periodontitis, Pyorrhœa, etc. ... ... Price **17/-**
F. General Purposes Applicator which can be used for all Cavities. Is very practical for dentists ... ... Price **17/-**
G. For nasal irradiations in rhinitis, hypertrophied turbinates, ozena, hay fever, etc. Localisation in acne pustules, verracæ and anziomata ... ... Price **12/-**
H. Treatment of corneal ulcers, irradiation of small sinus tracts, auditory meatus, stimulation of granulations in post operative wounds. Especially post operative mastoids with chronic discharge ... ... Price **11/-**
J. Nasal and pharyngeal exposures, in hypertrophied turbinates, also urethral, cervical and uterine radiations Price **21/-**

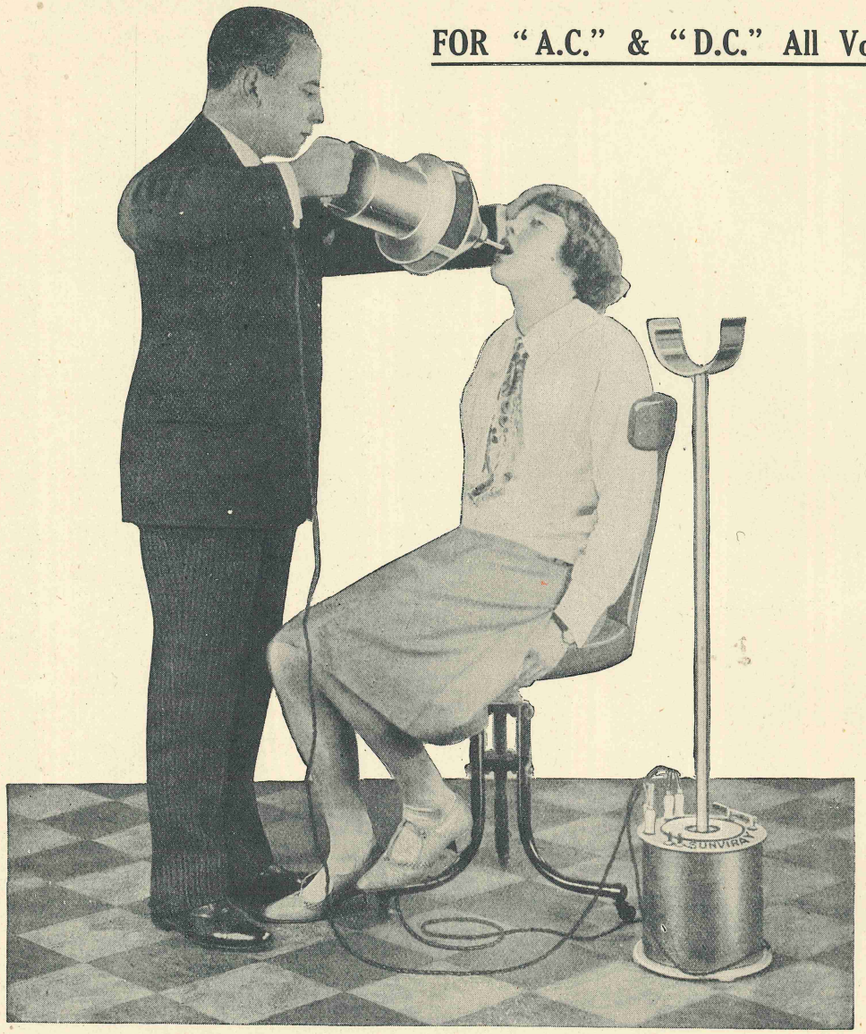
CAVITY TREATMENT AND DENTAL MODEL

Ajax "SUNVIRAY" Apparatus

(Reg. Trade Mark No. 479543)

The New "AJAX" Automatic Tungsten-Cored Carbon Arc Lamp.

FOR "A.C." & "D.C." All Voltages.



The Lamp can also be used for General or Flood Treatment with the Concentrator Hood removed.

A pure rock crystal Quartz Compressor lens mounted in an Aluminium cap, illustrated on opposite page, fits over the mouth of the Concentrator Hood for Local and Spot treatments.

The pure rock crystal Quartz Rod Applicator shown placed in the mouth on above illustration and also on opposite page on the apparatus, is also mounted on a cap that fits over the mouth of the Concentrator Hood. It can be inserted in the cavities to convey the Rays where required. The Applicator shown on illustrations is the standard model supplied, but a large assortment of other shapes are available for all different treatments required. (See page 93.)

To give it a certain amount of flexibility and to prevent jarring, the Rod is mounted in a small metal socket which, in turn, is rivetted to a Leather disc to which is also rivetted the cap that fits over the mouth of the Concentrator Hood.

THE "SUNVIRAY" AUTOMATIC TUNGSTEN-CORED CARBON ARC LAMP

(Reg. Trade Mark No. 479543)

Cavity Treatment and Dental Model

A New Mobile and General Treatment Apparatus Combined

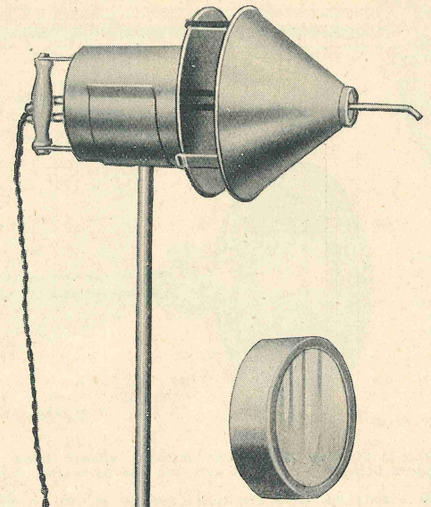
This special model mobile Lamp has been designed for the treatment of the Ear, Mouth, Nose, Throat, Rectum and Vagina, and it is particularly useful to Dentists.

The handle of this new Ultra-Violet Ray Generator is placed in a convenient position at the back of the lamp by which it is easily manipulated and held in position when in use.

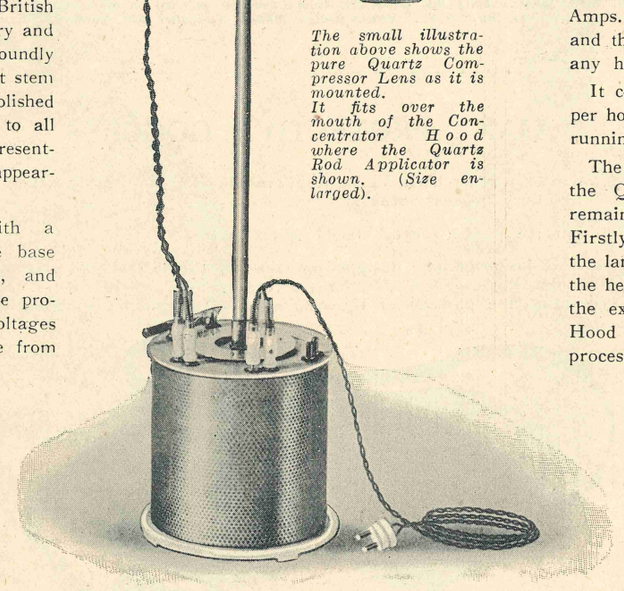
The lamp drum, the reflector and Concentrator Hood are made of Aluminium and are very light, flexible electric wire bringing the current to the burner.

The apparatus is British made in our own factory and it is strongly and soundly constructed: the upright stem is nickel-plated and polished and high finish given to all the parts, the whole presenting a very handsome appearance.

It is supplied with a Rotary switch at the base which ensures safety, and separate plug holes are provided for different voltages covering a wide range from 100 to 250 volts.



The small illustration above shows the pure Quartz Compressor Lens as it is mounted. It fits over the mouth of the Concentrator Hood where the Quartz Rod Applicator is shown. (Size enlarged).



The Concentrator Hood shown with the Quartz Rod Applicator is immediately removable by the four spring-on metal straps; the Lamp can then be used for General and Flood Treatment.

It functions equally well on Alternating and Direct currents and is guaranteed for five years.

When switching on the current, the Arc is immediately struck and the burner will function *automatically* until the carbons are burned out.

Each pair of carbons will last for about two hours.

The workmanship and finish of the whole apparatus rival that of those costing ten times as much.

The top and base plates of the Resistance Unit are of Aluminium.

The Lamp is constructed to consume current of 4½ to 5 Amps., Universal Voltage, and therefore can be used on any house-lighting circuit.

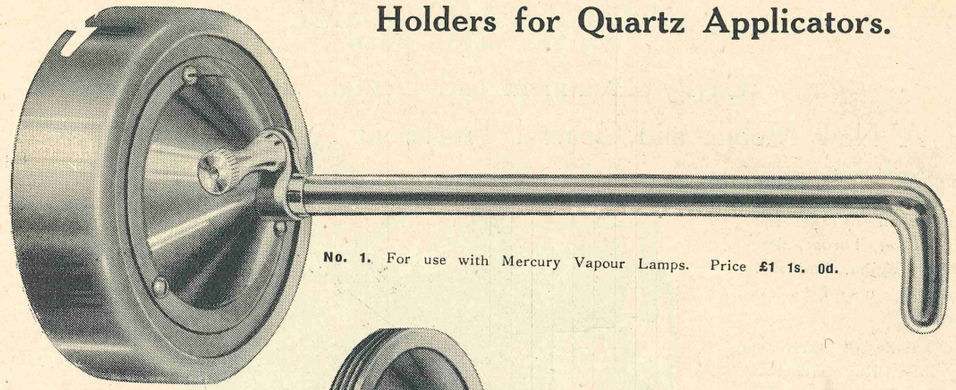
It consumes but One Unit per hour and thus the cost of running it is negligible.

The Compressor Lens and the Quartz Rod Applicator remain perfectly cool because Firstly: the air gap between the lamp and the hood allows the heat to escape. Secondly: the extensive surface of the Hood completes the cooling process.

A special cooling device is also arranged over the resistance unit by which there is free circulation of air for cooling purposes.

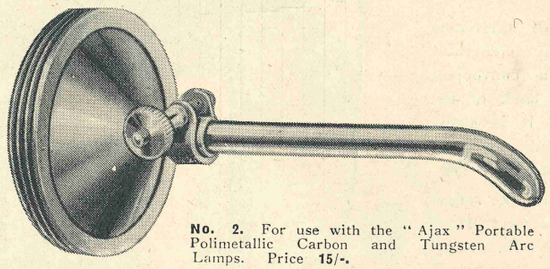
PRICE COMPLETE with Concentrator Hood, Quartz Lens and Quartz Rod Applicator and Holders ... £8 10s. 0d.

Holders for Quartz Applicators.



No. 1. For use with Mercury Vapour Lamps. Price **£1 1s. 0d.**

Highly finished and nickel-plated accessories specially arranged to fit the apparatus, with expanding mouthpiece suitable for the whole range of Quartz Applicators which are held by just turning the thumbscrew with the milled head, shown on illustration.



No. 2. For use with the "Ajax" Portable Polimetallic Carbon and Tungsten Arc Lamps. Price **15/-.**

The No. 1, larger holder, fits on to the inner hood of the Mercury Vapour Lamp over the Iris Diaphragm, and is arranged with a leather disc interposed between the conical part and the outer rim to give flexibility.

The No. 2, smaller size, takes exactly the same applicators and can be used on either the Portable Polimetallic Carbon or Tungsten Arc Lamp, and also for the "Ajax" Water-Cooled Mobile Tungsten Arc Lamp.

"AJAX" PROTECTIVE GOGGLES

It is indispensable for all operators in Ultra-Violet Ray Treatment to fully protect their eyes, as the retina is particularly sensitive to injury by these Rays.

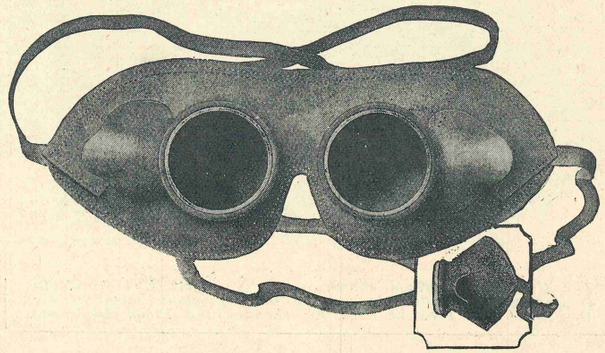
It is equally essential that the patient's eyes should be protected.

The "AJAX" Goggles have been specially designed on the most practical lines, and not only do they eliminate all the Ultra-Violet Rays, but also a large percentage of Infra Red Rays, thus not only offering full protection, but preventing the passage of the heat rays and completely subduing the glare.

The illustration shows our popular Model. Made in Washable indiarubber with linen tape fasteners. Can be completely sterilised instantaneously without dismantling or injury of any kind.

PRICE

per 4/9 pair

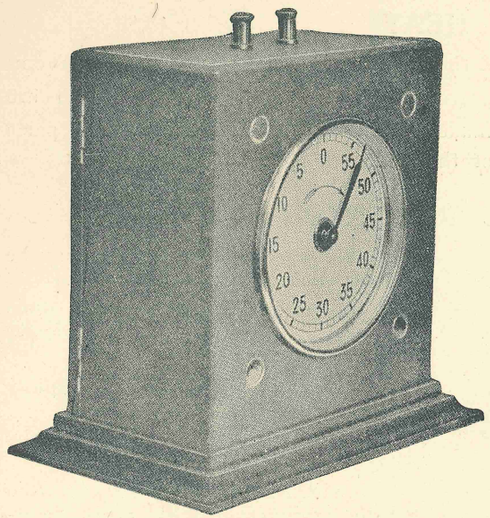


Also made in best special supple leather, highly finished, bordered with Chenil, making them most comfortable to wear. Fastened with elastic bands adjustable to any size. Special lenses mounted in spun metal rims.

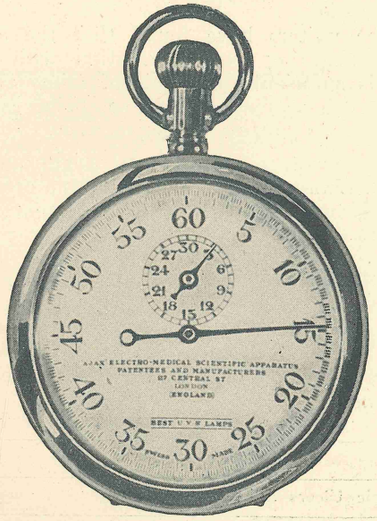
PRICE

per 3/9 pair

Exclusive Medical Time Pieces for Duration of Treatment.



"Ajax" Timing Recorder.



As will be seen by the illustration, this is in the form of a Chronograph Stop-Watch type of Minute Recorder. It records every one-fifth of a second up to 30 minutes, and this very useful and most accurate instrument has been found to be of immense service to the Medical Profession.

When wound up just as an ordinary watch, one merely presses the winding stem downwards and it starts off. It is stopped by the same operation, that is to say, just pressing in the winding stem, and then it is made ready for further use again in the same manner, namely, by slight pressure on the winding stem. It is the simplest and most appropriate instrument for the purpose yet invented.

The Recorder shows 3 minutes 14⅘ seconds have elapsed; it records the precise length of time by one-fifth seconds up to 30 minutes.

Size as shown on illustration, PRICE **29/6.**

THE "AJAX"

"Duration of Treatment" Signal Alarm Clock.

This is a simple apparatus by which a loud warning is given when the precise length of time for the prescribed treatment has elapsed. It can be set for any number of minutes or half minutes from a half-minute to 60 minutes. The illustration shows, for instance, that it is set for 53 minutes' treatment.

It is mounted in highly polished maple case with polished nickel-plated fittings.

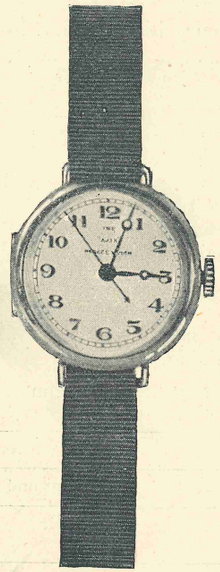
It can also be adapted to an ordinary electric bell installation, by the terminals shown on the top of illustration, to ring a bell in the doctor's consulting room also, when the treatment is concluded.

It is made on the principle of an alarm clock and cannot get out of order.

Guaranteed for Five Years. **Height 7 in. Base 7 in. wide.**

PRICE COMPLETE - **28/6.**

Nurses' perfect timekeeping Centre Seconds Watches for taking the pulse.



This handsome solid Sterling Silver Wristlet, 15-Jewel Timepiece, whilst of neat and dainty appearance, is a perfect timekeeper and precisely what is required for "taking the pulse"; the illustration shows the long centre seconds' hand that facilitates the counting so much. It is mounted on a moire silk adjustable Wrist Strap and is exact size of illustration. Initials are engraved on the watch, free of charge, when cash in full is sent with the order. In Sterling Silver (in case) post free to all parts of the world.

PRICE - **39/9.**

(In 9 ct. Gold, **73/-.**)

RADIANT HEAT AND FILTERED LIGHT THERAPY

RADIANT HEAT

A system of treatment by means of Light and Heat Rays. Luminous Heat Rays penetrate the body to a large extent assisting metabolism and increasing the activity of the deep-seated organs.

Carbon filament lamps are generally employed in Radiant Heat Baths, which are made of various shapes for particular parts of the body.

SPECTROSCOPIC RADIATION

is the science of coloured light treatment. During recent years the therapeutic effects of coloured light have been explored and exploited, and it has been ascertained that a very definite curative effect can result from irradiation in certain cases.

The results obtained by "sunlight" methods are, in the writer's opinion, to be attributed to two factors:

(1) The germicidal effect of sunrays; and

(2) The inherent capacity of each patient to absorb such portions of the solar spectrum as tend to favourably influence his disorder.

If this country were more favourably situated as regards to regular sunlight, it is possible that a system might be devised whereby those needing certain portions of the spectrum might obtain them from sunlight, being shielded from those portions of the spectrum not required; but the limitations and non-dependability of our sunlight prevent this in fact being a practical method.

The electric light forms an effective substitute for sunlight, and has the great advantage of being regularly available and easily controllable.

Where heat in conjunction with light is desired carbon lamps in frosted bulbs may be used; with or without coloured screens.

A single illustration of what can be done by these coloured rays will suffice to indicate their utility:

The vesicles of smallpox will rapidly clear up under exposure to red rays.

A chart is appended giving details of the action and uses of the various colours.

Irradiation with coloured light may be used alone, or in conjunction with other treatment, such as drugs or by High Frequency currents.

Some writers have found that the anæsthesia resulting from irradiation with blue light is sufficient to permit of minor operations, such as teeth extraction, being carried out without distress to the patient.

Applications of the Finsen Light and of Quartz Lamps in general differs from ordinary spectroscopic radiation, though certain parts of the spectrum are utilised in these processes. Those who contemplate using these lamps should refer to the special text-books on the subject, but the uses of coloured light for general treatment may be undertaken without need for more than a study of the chart appended, which will serve as a guide and reference.

Colour.	Action.	Used in Cases of:
Red	Exciting and Irritant	Chronic Ulcers and Smallpox.
Blue	Analgesic	Headache, Stomatitis, Arthritis, Insomnia, Mental States and as Anæsthetic.
Yellow	Purgative	Constipation.
Indigo	Stimulant, Sedative	Lumbago, Over-Fatigue.
Green	Germicide	Rheumatism, After-Effects of Appendix Removal.
Pink	Mild Tonic and Refreshing	Neurasthenia.
Lilac and Mauve	Mildly Sedative	Neuroticism.

THE AJAX RADIANT HEAT AND LIGHT UNIT.

WITH MOBILE PARABOLIC LAMP FOR LOCAL APPLICATION.

INSTANT ADJUSTMENT TO ANY ANGLE.

This new apparatus embodies in remarkable fashion all the virtues of half-a-dozen treatment units, whilst possessing a degree of efficiency, economy and adaptability hitherto lacking. The basis of the Unit is our well-known Parabolic Lamp. It is attached to a stand and is at once rigid and adjustable, and the lamp can be instantly removed if desired.

A highly efficient switch box is fitted, and clips are added to the lamp so that a series of coloured light Filters can be used, thereby transforming the Unit into an Outfit for Spectroscopic Radiation.

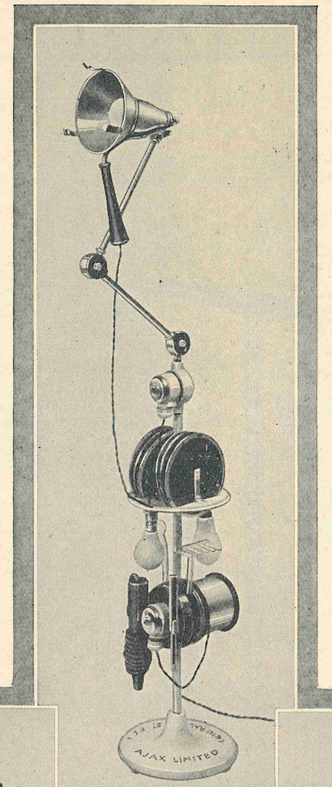
The adjustable arm is unique and can be instantly placed at any desired angle without having to arrange and fix a lot of nuts and bolts.

In fact, clamping devices are conspicuous by their absence.

On Model B will be found a very highly efficient High Frequency Generator for combining H.F. treatment with Spectroscopic Radiation.

A range of High Frequency Electrodes are provided.

We are indebted to Dr. K. R. D. SHAW for his help and guidance in devising this Model, which has been approved, and is in daily use by him and many other prominent Medical men.



MODEL B.—COMBINED WITH HIGH FREQUENCY.

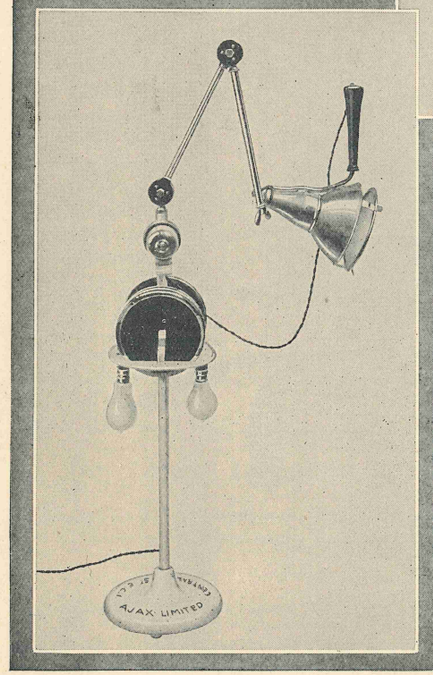
The whole forms a complete Unit for Radiant Heat and Light, Spectroscopic Radiation, High Frequency and Exploration.

Model A.—A solid base with patent movable arm, mobile parabolic hand lamp, switch box, one set of 6 selected coloured light filters, one 32 c.p. carbon filament lamp for Radiant Heat, and one 60 watt gas-filled white sprayed lamp for Spectroscopic Radiation and Exploration. Wired with best silk flex, fitted with wall plug or lamp adaptor as desired. Can be used on any voltage, either alternating or direct current.

Price complete £7 7s. 0d.

Model B.—All the above are supplied, with the addition of a powerful High Frequency Generator, which can be used either separately or in conjunction with the Heat and Light Unit. 1 surface, 1 rake and 1 metal electrode are included. All voltages.

Price complete £10 10s. 0d.

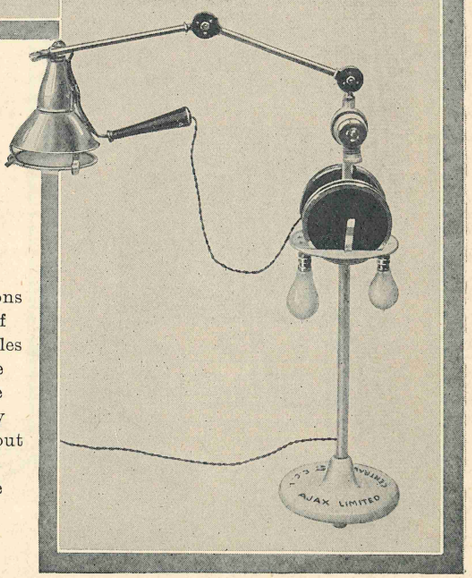


Model A.—For Radiant Heat, Spectroscopic Radiation and Exploration.

Model B

Same as the Model A, but with addition of a High Frequency Generator.

The illustrations show three of the many angles to which the lamp can be immediately adjusted without the use of troublesome clamping devices.



Another view of Model A, showing useful position for use over a bed or couch.

(PAT. NO. 253276/25).

THE AJAX
"HEATANLYTE"
RADIANT HEAT AND FILTERED LIGHT LAMP

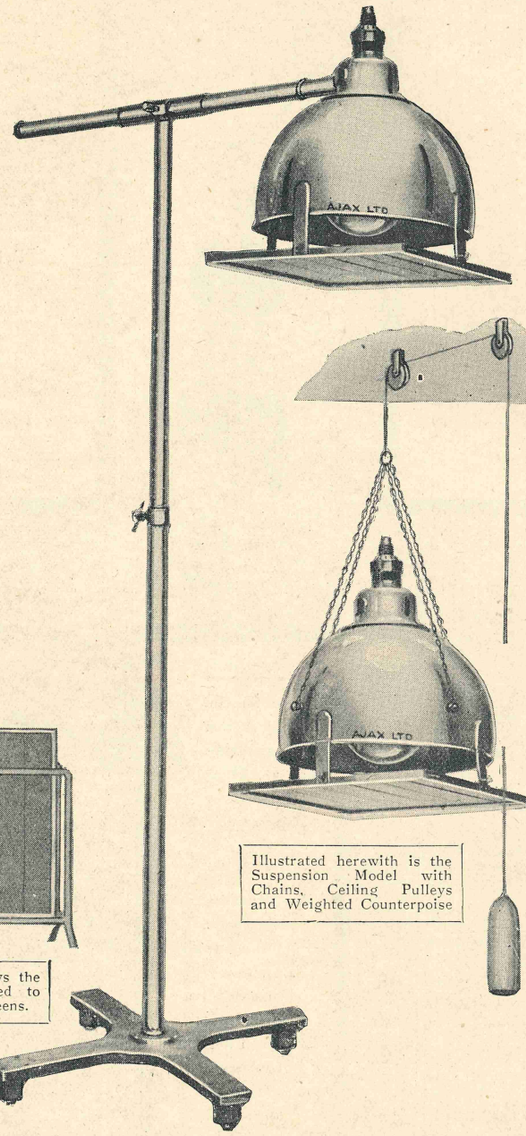
2,000 CANDLE POWER — MOBILE COLOUR SCREENS — SUSPENSION AND STAND MODELS

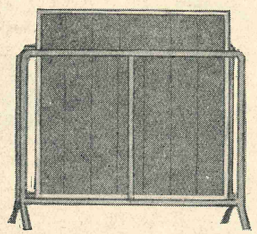
This Radiant Heat and Light Unit has been specially designed to the specification of a well-known authority on Actino-therapy.

It generates great heat, regulated at will by the distance at which it is placed from the patient, whom it keeps warm during Ultra-Violet Irradiation.

The great candle-power gives a flood of light that is considered to be most useful in the treatment, and many are the protagonists of the value of light and filtered light rays.

Apart from the use of the "Heatanlyte" Apparatus as an adjunct in "Sunlight" Treatment, it has been welcomed as a particularly useful apparatus for Radiant Heat and filtered Light Treatment; the colour screens fit in a groove and are instantaneously removable.





This illustration shows the Floor Stand designed to hold the spare screens.

Illustrated herewith is the Suspension Model with Chains, Ceiling Pulleys and Weighted Counterpoise

MADE IN TWO MODELS

(A)
STAND MODEL

Fitted with up and down and horizontal adjustment movement. A polished screen holder is fitted to underside of lamp so that coloured filters can be used at will for spectroscopic radiation.

(B)
SUSPENSION MODEL

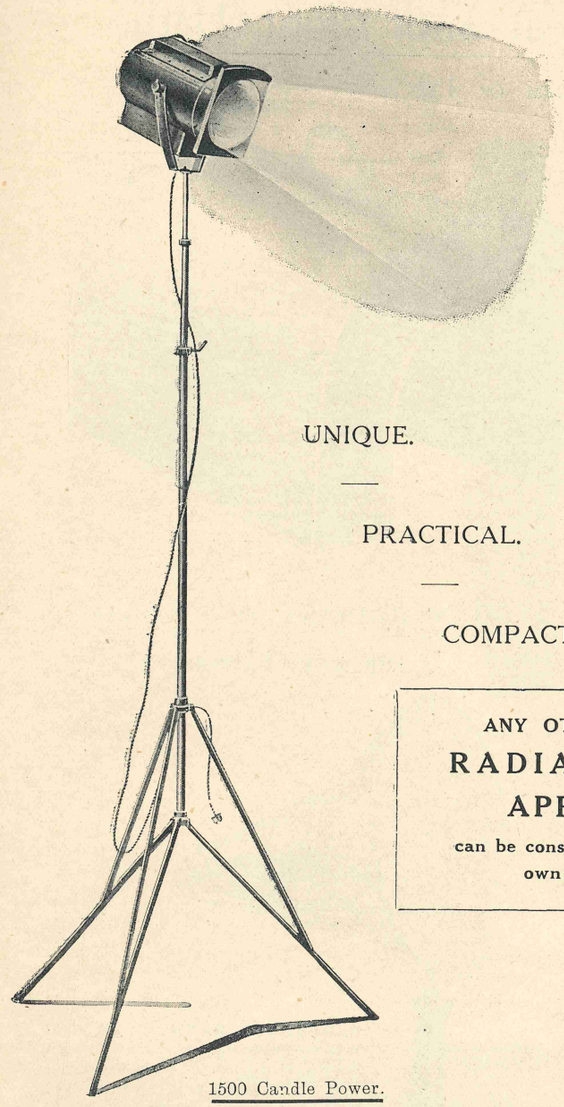
Similar in design to the Stand Model but is intended for use where economy of space is a consideration. Chains, ceiling pulleys and a weighted counterpoise are included in this model.

Spare Screens of any Colour can be provided to order. Price each, 10/6.

PRICE COMPLETE, STAND MODEL, with Red and Blue Screen **£10 10 0**

" " SUSPENSION MODEL " " **£8 8 0**

TWO NEW "AJAX" HEAT AND LIGHT UNITS.



UNIQUE.

PRACTICAL.

COMPACT.

1500 Candle Power.

The "Ajax" Leucodescent Projector.

For Leucodescent Irradiation and Spectroscopic Radiation.

Guaranteed 1500 candle power lamp, and can be used on a very low amperage, 2.5 amps. sufficing.

Mounted on adjustable nickel-plated stand, which can be folded up when not in use.

Complete and ready for use, comprising Projector, 1500 c.p. silver-plated lamp, bi-convex lens, screen holder with set of 6 coloured filters, collapsible stand, flex and plugs ... **£9 9s. 0d.**

The "Ajax" Hinged Radiant Heat Bath with Stand.

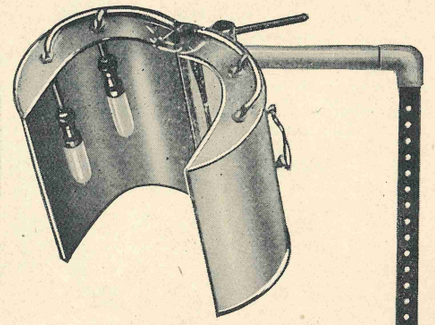
(Reg. Design 677837)

This model enables regions otherwise inaccessible, such as the shoulder, thigh, etc., to be treated with a maximum of efficiency. Particularly useful for sitting postures.

The Bath is hinged to allow fixing in position desired.

It is mounted on an adjustable stand with a patent swivel locking device which was designed and is used by Dr. Francis Howard Humphriss, M.D.

Is absolutely adaptable and can be used at any candle power desired and on any voltage, either alternating or direct current.



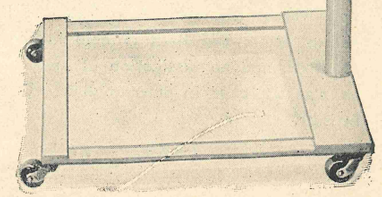
Complete with any candle power lamps desired **£8 8s. 0d.**

ANY OTHER TYPE OF
RADIANT HEAT APPLIANCE
can be constructed to customers' own specification.

UNRIVALLED FOR GENERAL UTILITY.

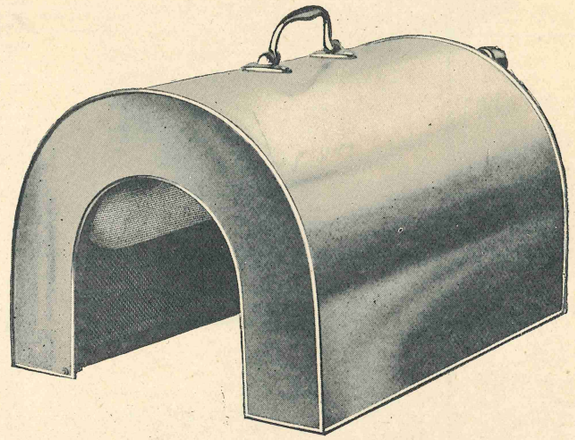
EFFICIENT.

Adjustable to any angle and height.



"Ajax" Radiant Heat and Light Baths

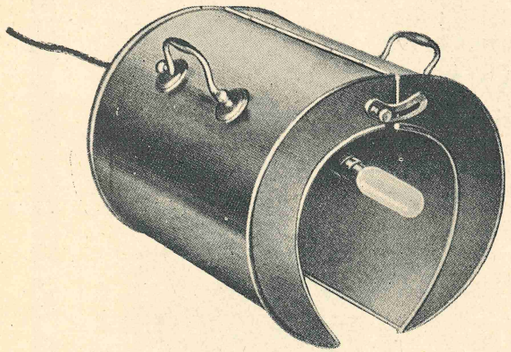
FOR THE ARM OR LEG



ARM AND LEG BATH (Regd. Design No. 677836), fitted with 11in. triple light and heat generators, porcelain and mica insulations and silvered guard, forming a perfect arch and ensuring absolutely even radiation. Fitted with plug or lamp adaptor and cable.

PRICE - **£8 8s.**

AJAX RADIANT HEAT BATH



HINGED BATH (Regd. Design No. 677837). This model enables regions otherwise inaccessible, such as the armpit, shoulder, etc., to be treated, with a maximum of efficacy and without loss of radiation. It is quite unique, and has met with the enthusiastic approval of the medical profession. By means of a sliding scale, the Bath is held in the exact position required, and no dissipation of heat and light occurs, as was the case in older models. Complete with all fittings.

PRICE - **£7 7s.**

AJAX RADIANT HEAT BATH

PARABOLIC PATTERN

PARABOLIC BATH (Regd. Design No. 678471). For all purposes where a moveable bath is desirable. This model is absolutely unique, and for local and mobile treatments cannot be equalled. The radiation has been focussed with mathematical accuracy in a cone shaped parabolic reflector, which by its special shape and brilliant finish throws a powerful ray. We specially invite the attention of medical men to this Parabolic Bath, as every Doctor who has seen it considers this model an immense improvement upon all other patterns. Its efficacy is quickly realised and appreciated.

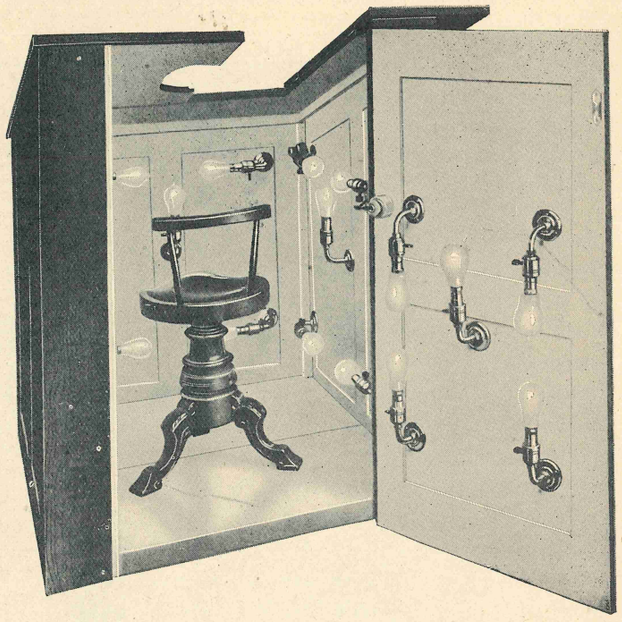
PRICE - **£3 3s.**

"Ajax" Radiant Heat and Light Baths

CABINET BATH (Regd. Design No. 677840), for complete immersion. The Cabinet is of polished walnut, with panels and struts to prevent warpage. The interior is of white glaze, which reflects and equalises the radiation. Twenty carbon heat and light units are fitted, controlled by switches, and a specially designed variable seat enables the Cabinet to be used with an amount of comfort and efficacy which other models of Cabinet Baths do not yield. The Registering Thermometer and Timing Clock are arranged to indicate the time and temperature so plainly that mistakes are obviated. A great deal of pains and trouble have been taken to make this Cabinet Bath the acme of perfection and therapeutic desiderata, and those who need this type of Cabinet will find it a lasting source of comfort and efficacy.

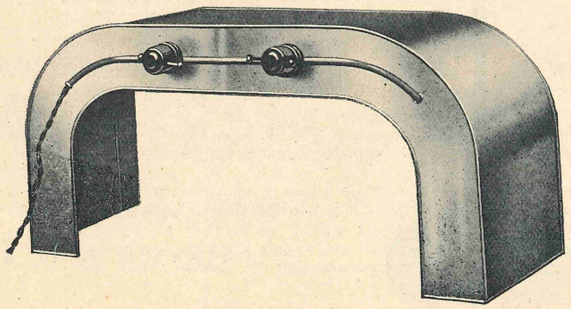
PRICE - **£52 10s.**

(For purposes of transit or storage, the Cabinet Bath is readily dismantled, and packs flat. All orders for Heat and Light Baths should be accompanied by details of the voltage of your electric supply, and whether it is Direct or Alternating Current.)



AJAX RADIANT HEAT BATH

FOR THE CHEST, BACK OR ABDOMEN



TRUNK BATH (Regd. Design No. 677838). This is a Bath for the treatment of the Chest, Back, Shoulders, Abdomen or Glutei, and is so arranged as to afford even radiation over a wide surface. The radiant units are in series, and three varieties of radiation can be obtained, by means of the switches provided. Complete with fittings and regulators.

PRICE - **£10 10s**

AJAX "NURSERY" U.V.R. LAMP

FOR CHILDREN, INVALIDS AND CONVALESCENTS ON SUNLESS DAYS

COMBINES LIGHT AND HEAT WITH MILD ULTRA-VIOLET IRRADIATION.

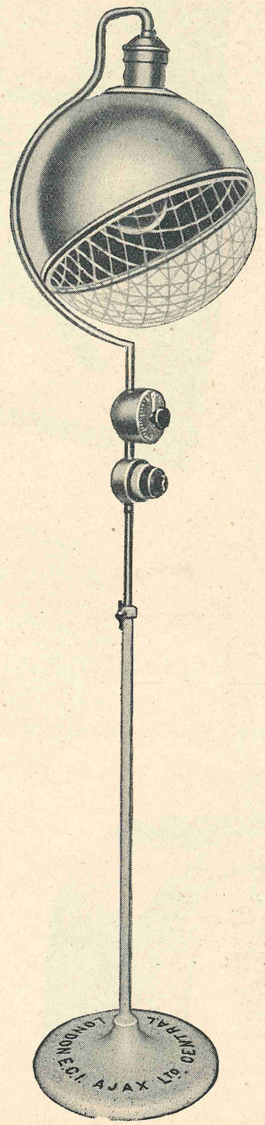
"AS GOOD AS A REAL SUN BATH."

NO GOGGLES REQUIRED. ***UNLIMITED EXPOSURES.***

Prompted by repeated requests from the Medical Profession for a mild power U.V.R. Lamp that could be used in the home without supervision, particularly for ailing or weakly children, by which a "Sun Bath" could be taken or given at will without possibility of danger, of such modest Ultra Violet Ray output that even the eyes could not be adversely affected, the mobile unit here illustrated has been designed.

The Tungsten filament in the Generating Bulb made of Vitaglass emits Ultra Violet Rays, as in the Solar Spectrum, from 4,000 A.U. to 2,900 A.U. It is a 300 watt unit giving about 600 candle power light which is modified in this lamp to give a rich golden sun colour effect; very appreciable heat is radiated and adds to the comfort in using this lamp.

A Rotary "ON" and "OFF" switch is fitted as well as a "Strong," "Mild" and "Weak" Regulator.



Registered Design No. 734282.

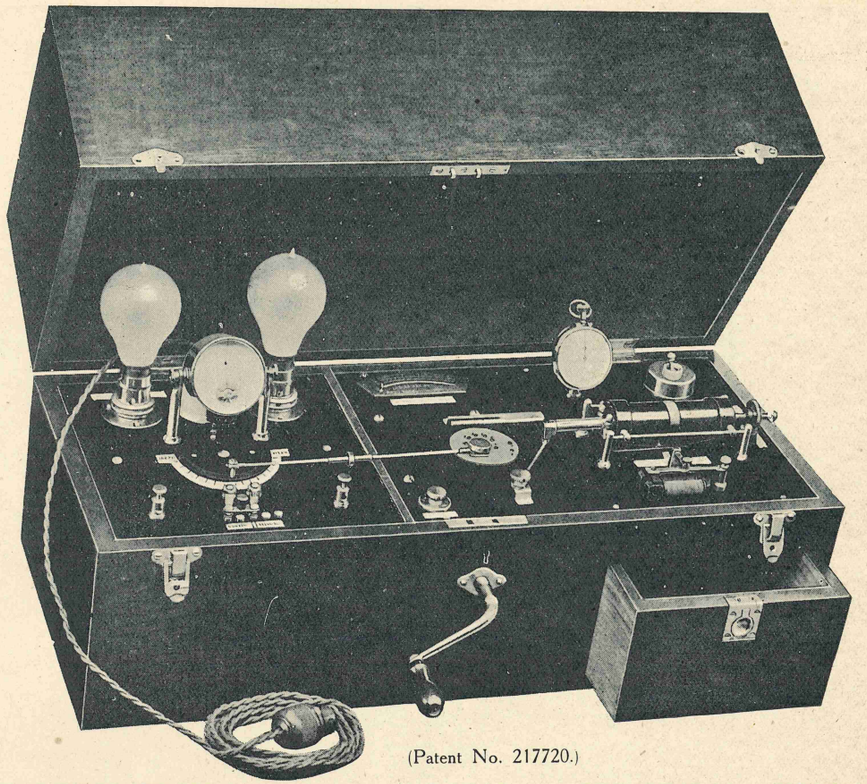
At lowest strength even young babes can enjoy this "Sun Bath," whilst at "Strong" it is ideal for "Sun-lighting" the nursery or any room in the house as well as for close application for invalids and convalescents and also for any member of the household requiring just the "Tonic" effect of a "Sun Bath" or the benefit of the Radiant Heat for the relief of minor pains and aches.

The polished nickel-plated copper hood with wire guard is suspended as shown, and the Regulator Unit and the Rotary Switch are fitted to the polished nickel-plated tubular rod that suspends the hood and gives the "up and down" movement in the tube running to the white enamelled base.

Of the highest finish, this is an elegant and efficient unit that can be safely prescribed for all homes.

PRICE COMPLETE AS ILLUSTRATED **£7 10 0**

THE "AJAX" SINUSOIDAL GENERATOR.



(Patent No. 217720.)

IONIC MEDICATION

SURGING & SINUSOIDAL CURRENTS

ELECTROLYSIS

FOR STABILE AND LABILE GALVANISM

MUSCLE AND NERVE REACTION TESTING

This Model consists of a polished mahogany cabinet with drawer and handles for carrying. The cabinet is divided into three sections, the first containing the water resistance, fixed and moveable electrodes, with ball-bearing connections, resistance lamps, inlet and outlet terminals, and milliameter with shunt circuits.

The second section contains a motor which drives the electrodes together with thumbscrew adjustments for varying the intensity of the current and the periodicity of the current cycles, and an ingenious scale for recording the cycle periodicity during treatment.

The third section contains a high-class Faradic Coil mounted upon a rack to permit wide adjustment, and a coil core sleeve which by ingenious mechanism surges in complete rhythm by the power of the motor.

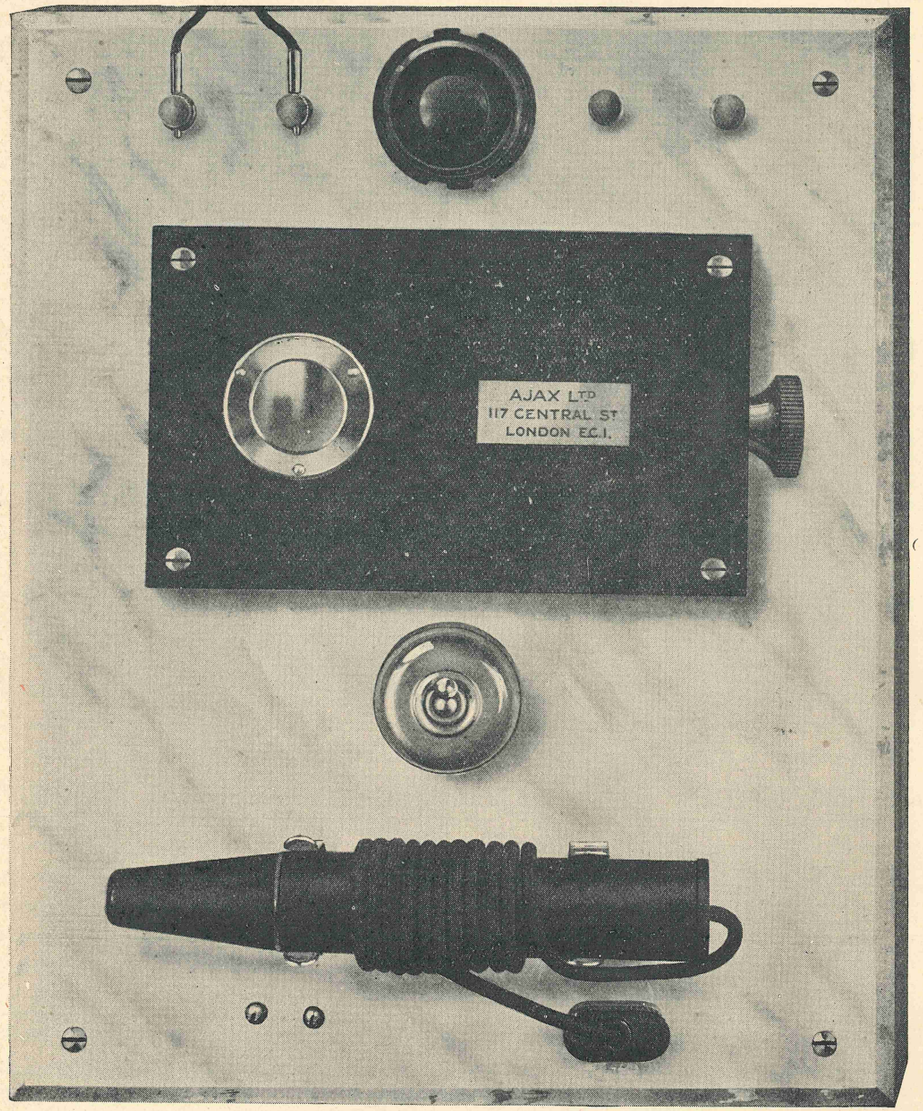
Fully Guaranteed and Complete for any Desired Voltage **£42**

AJAX "HIGH FREQUENCY" APPARATUS

(VIOLET RAYS).

PRICE - - - **£7 17s. 6d.**

INCLUDING SIX ELECTRODES (see illustration on opposite page.)
OR WITH SEVEN ELECTRODES (illustrated on page 108.)



This model consists of a powerful High Frequency Generator mounted on a marble base, and is particularly suitable for fitting to the wall of the consulting room. It is guaranteed to be earth free.

The generator is contained in a nickel-plated framework covered with polished ebonite to which is fitted a coloured view window permitting examination of the resistance lamp and coil at will.

The spark gap is completely under control, allowing of a strong or mild current as desired.

This handsome outfit is completed with a fuse-box, nickel-plated switch, non-porous ebonite electrode holder and set of six vacuum electrodes illustrated on opposite page.

It can be supplied for any voltage and can be used on either Alternating or Direct Current.

"HIGH FREQUENCY"

(VIOLET RAYS).

High Frequency Current, commonly known as *Violet Rays*, must on no account be confused with *Ultra-Violet Rays*.

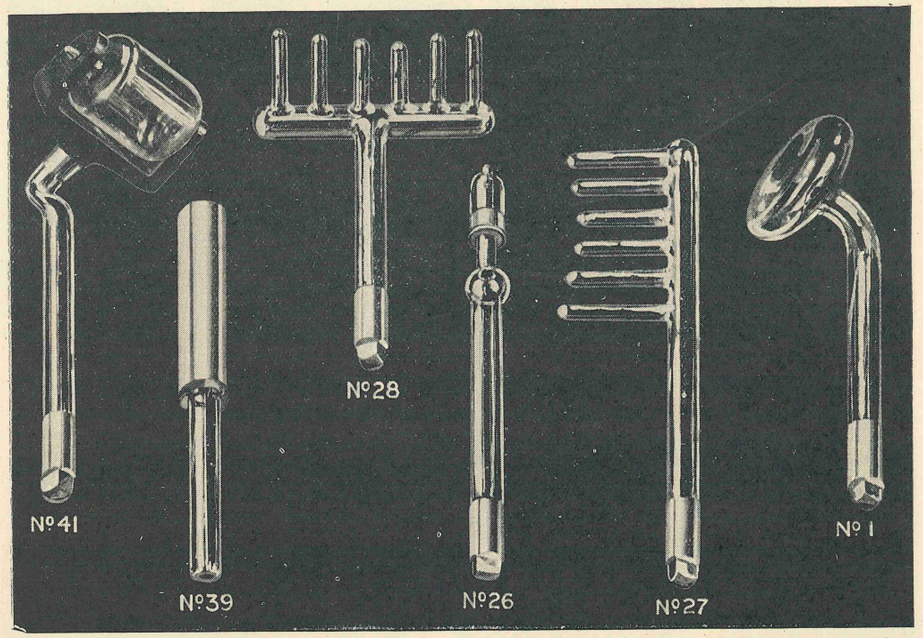
Ultra-Violet Rays are chemical in action, quite invisible and are found in the region beyond the violet end of the spectrum.

A High Frequency Current is a current of very high potential—of extremely rapid frequency. It has been demonstrated that with a current of over 100,000 oscillations per second the sensory nerves are incapable of pain. The oscillations of the "Ajax" High Frequency generator run into millions a second, and it can therefore be used without fear of pain or any bodily discomfort.

In local pain such as Rheumatism, Sciatica, Neuralgia, Neuritis, etc., healing is brought about primarily by an improved blood circulation, combined with the heating effect. The Nervous System is also invigorated, and generally the High Frequency Current stimulates metabolism.

Dr. H. Lewis Jones, M.D., in his book *Medical Electricity*, states that "High Frequency is also a very valuable stimulant to the skin, and this too has been found useful in numerous forms of skin disease."

To sum up, the High Frequency Current has unlimited therapeutic properties too numerous to set out here, even Dentistry coming within its range of usefulness. (See illustrations of special dental electrodes, page 108).



The High Frequency Electrodes illustrated above are supplied *free* with the Marble Wall, Model Apparatus specified and shown on opposite page, or they can be purchased separately.

No. 41. A ROLLER ELECTRODE—the roller filled with neon gas is especially suitable for massage work, mild tonic effect and the allaying of the erythema produced by the application of strong current with the ordinary vacuum electrode ... ... **Price 10/6**

No. 39. A SATURATOR ELECTRODE—for treatment by the indirect method. The patient holds the electrode and the operator conveys the current to any desired part of the body by hand massage ... **Price 3/-**

No. 28. A RAKE ELECTRODE—for scalp. Electrode used in cases of alopecia and other scalp disorders ... **Price 4/-**

No. 26. A CAUTERY OR FULGURATOR ELECTRODE—for the treatment of warts, corns, moles and cautery work ... ... **Price 4/-**

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Illustrated above is a complete set of High Frequency Electrodes that will be found to cover the complete wants of the Dental Practitioner.

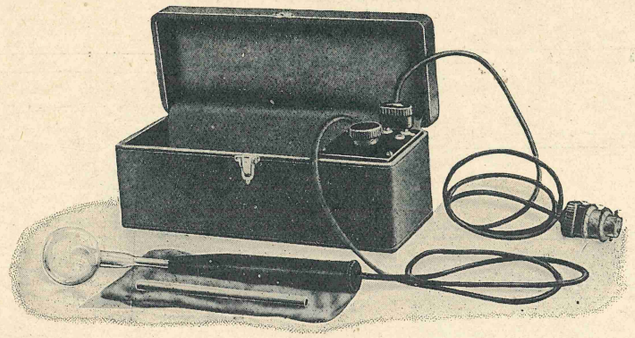
Each electrode has its own precise use, but the range includes suitable applicators for both local and general treatments.

A really reliable High Frequency Generator, handsomely mounted on polished marble base, with which all above electrodes can be used, is shown on page 106.

Price complete, with full set of Electrodes, **£7 17s. 6d.**

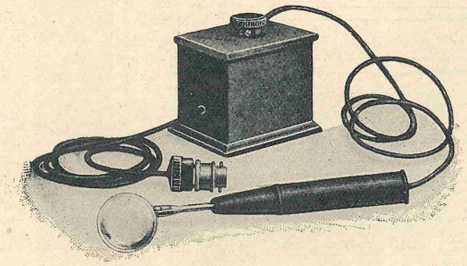
The "Ajax" High Frequency (Violet Ray) Apparatus

PORTABLE MODELS



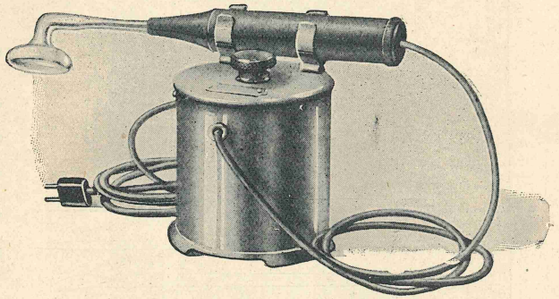
TYPE "C."

Complete in strong case, with long flexible wire and wall or lamp plug, Surface and Comb Electrodes, guaranteed earth free, Universal Voltage ... **£3 3s. 0d.**



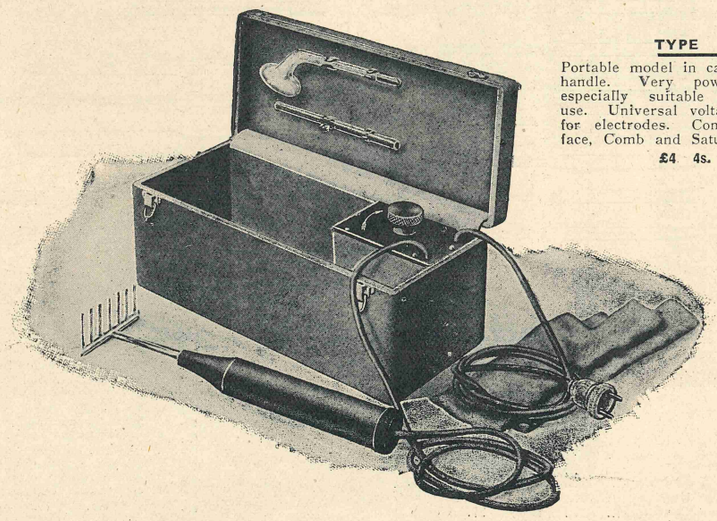
TYPE "B."

Complete with Handle, Flexible Wire, Wall or Lamp Plug and Surface Electrode. Earth free, two voltages ... **£2 12s. 6d.**



TYPE "D."

Nickel-plated throughout, powerful generator for 110 or 220 volts. Very handsome model. Complete with Surface, Comb and Saturator Electrodes ... ... **£3 17s. 6d.**



TYPE "E."

Portable model in case with carrying handle. Very powerful generator, especially suitable for professional use. Universal voltage, clips in lid for electrodes. Complete with Surface, Comb and Saturator Electrodes.

£4 4s. 0d.

The "Ajax" High Frequency (Violet Ray) Electrodes

FULLY GUARANTEED FOR SOUND FINISH

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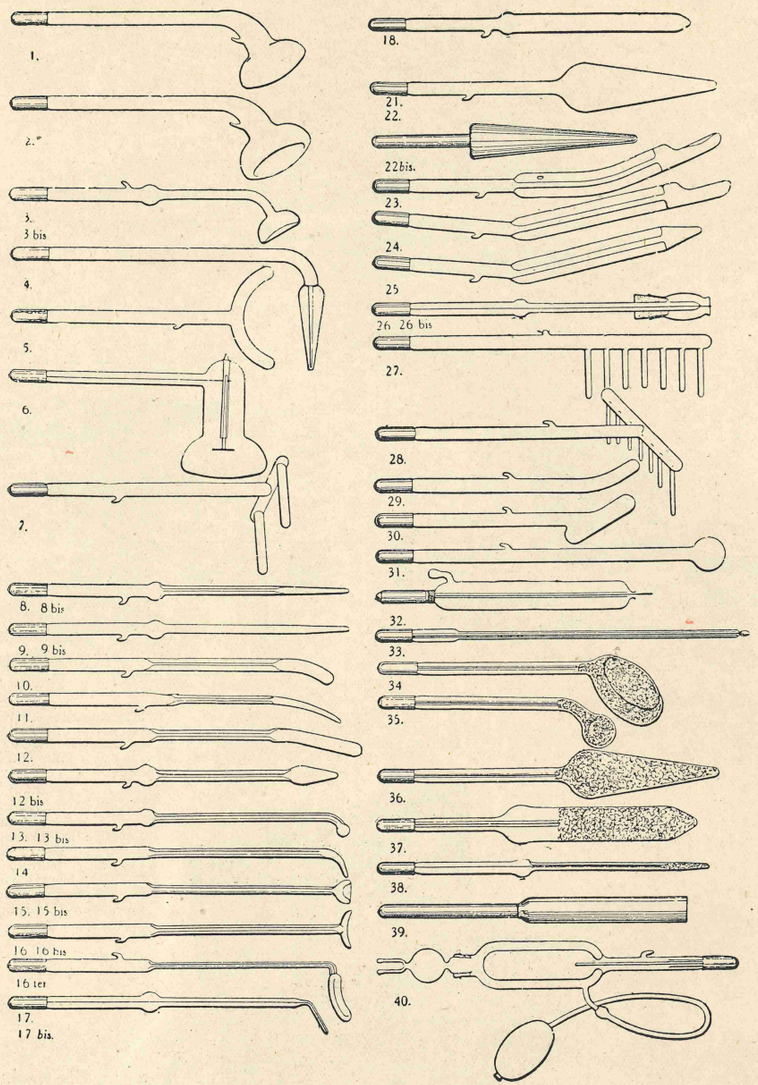
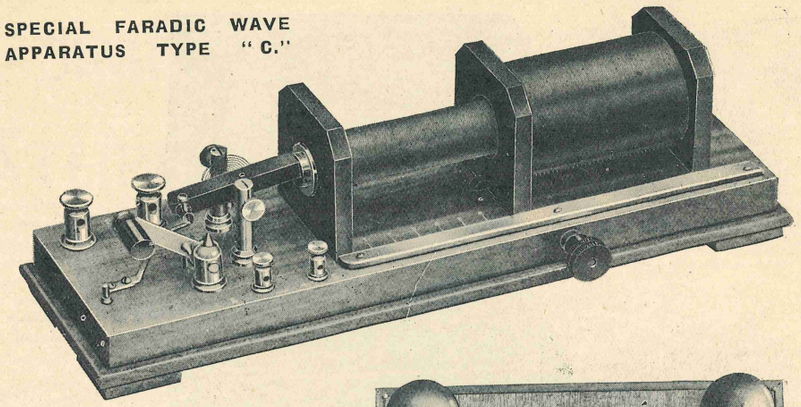


1.	Surface	2/-	14.	Dental Cavity	5/6	28.	Rake	4/-
2.	Large Concave Surface ...	3/-	15.	Dental Cataphoretic	5/6	29.	Cylindrical Surface	5/-
3.	Small ,, ,, ...	3/-	16.	Dental Frontal Gum	5/6	30.	Cylindrical Surface	5/-
4.	Aural or Nasal	4/-	16 ter.	Dental Side Gum	5/6	31.	Ball-Pointed	5/-
5.	Throat	4/-	17.	Dental Fulgurator	5/6	32.	Cautery	6/-
6.	Condenser	10/-	18.	Rectal	5/6	33.	Fulgurator Olive Tipped ...	5/-
7.	Spinal	4/-	21, 22.	Hæmorrhoidal	5/-	34.	Spatula Tinsel Filled	5/-
8.	Urethral Insulated	5/-	22 bis.	Hæmorrhoidal Metal ...	4/-	35.	Tinsel Filled, Ball Pointed ...	5/-
9.	Urethral Plain	4/6	23.	Vaginal	6/-	36.	Hæmorrhoidal Tinsel Filled ...	5/-
10.	Uterine	4/6	24.	Prostatic	6/-	37	Rectal Tinsel Filled	5/-
11.	Urethral Curved	4/6	25.	Rectal	6/-	38.	Urethral Tinsel Filled ...	4/-
12, 12 bis.	Intra Uterine	7/6	26, 26 bis.	Fulgurator	4/-	39.	Metal Saturator	3/-
13.	Dental Pyorrhœa	5/6	27.	Comb	4/-	40.	Ozone Generator	21/-

This apparatus has been specially designed to supply the current in the form of wave impulses, which cause the contraction of the muscle under treatment followed by a period of relaxation and rest. With the ordinary coil this relaxation and rest cannot be obtained because the impulses follow each other in very rapid succession. By using this apparatus any muscle may be exercised without necessarily requiring the attention of a masseur or nurse. By means of the small lever on the left-hand side, the speed of the wave frequency can be regulated from anything between 60 up to 2,000 per minute. The apparatus is mounted on a polished mahogany base and is complete with electrodes, cords, cells, etc.

PRICE COMPLETE
£6 6s. 0d.

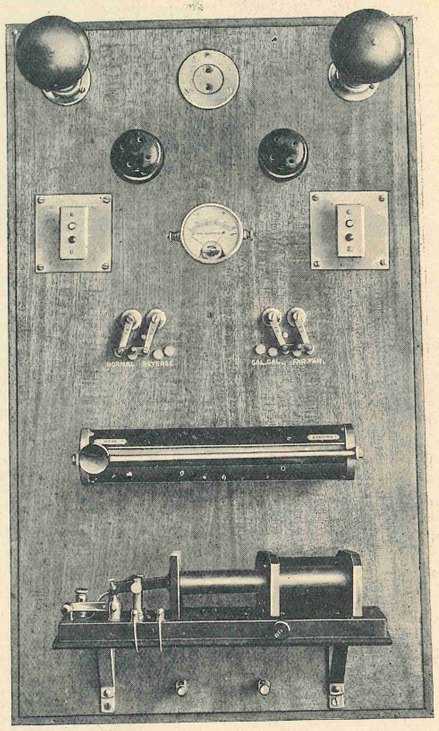
SPECIAL FARADIC WAVE APPARATUS TYPE "C."

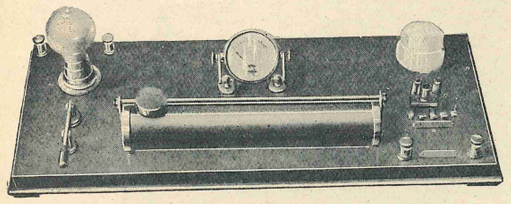


CONSULTANT'S SWITCH-BOARD TYPE "A.W."

Similar apparatus to Type A.T., but is constructed for fixing to the wall. An efficient and highly finished model of handsome appearance.

PRICE COMPLETE - - - **£16 16 0** →





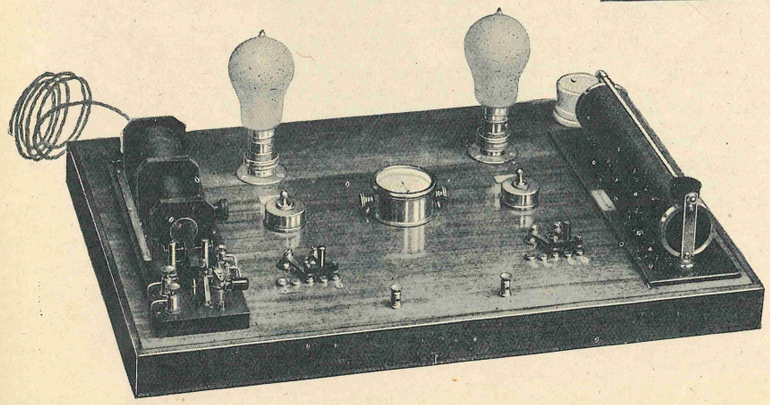
GALVANIC SWITCH-BOARD TYPE B.P.

For use on continuous current mains or a current from accumulators for Galvanisation, Ionic Medication, etc.

Switch-board of polished mahogany with shunt rheostat, incandescent signal lamp, knife switch, china fuse, milliampere-meter, two terminals for main and two terminals for electrodes and permanent wire shunt resistance complete with set of cords and electrodes.

This switch-board can be fastened to wall or used as a portable apparatus.

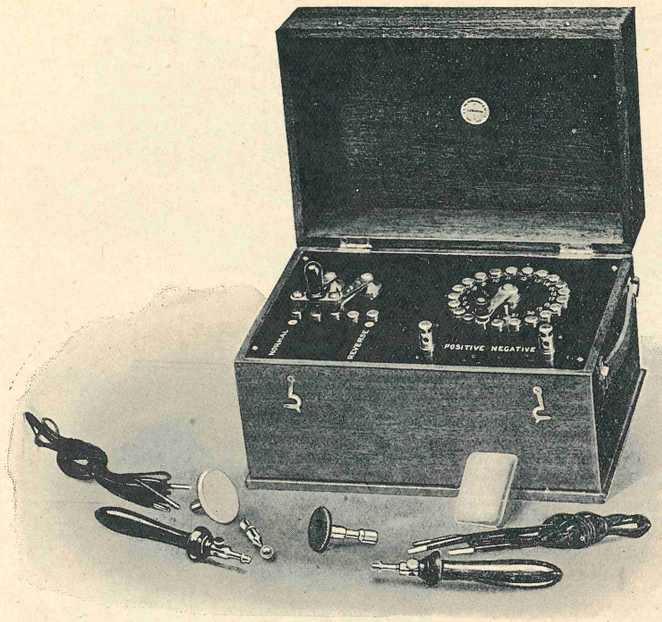
PRICE COMPLETE - - - **£7 7 0**



PRACTITIONER'S PORTABLE SWITCH-BOARD TYPE "A.T."

The switch-board illustrated is of very small dimensions, and can easily be carried about by the practitioner from one house to another. It will run on any direct current and is fitted with a lid which is not shown in the illustration. Made in polished mahogany or ebonised mahogany at request. It can be used for Galvanism, Faradism, Ionic Medication, and all other electrical treatments where a continuous current is used.

PRICE COMPLETE
£16 16s. 0d.



DRY-CELL BATTERY

TYPE " D.S."

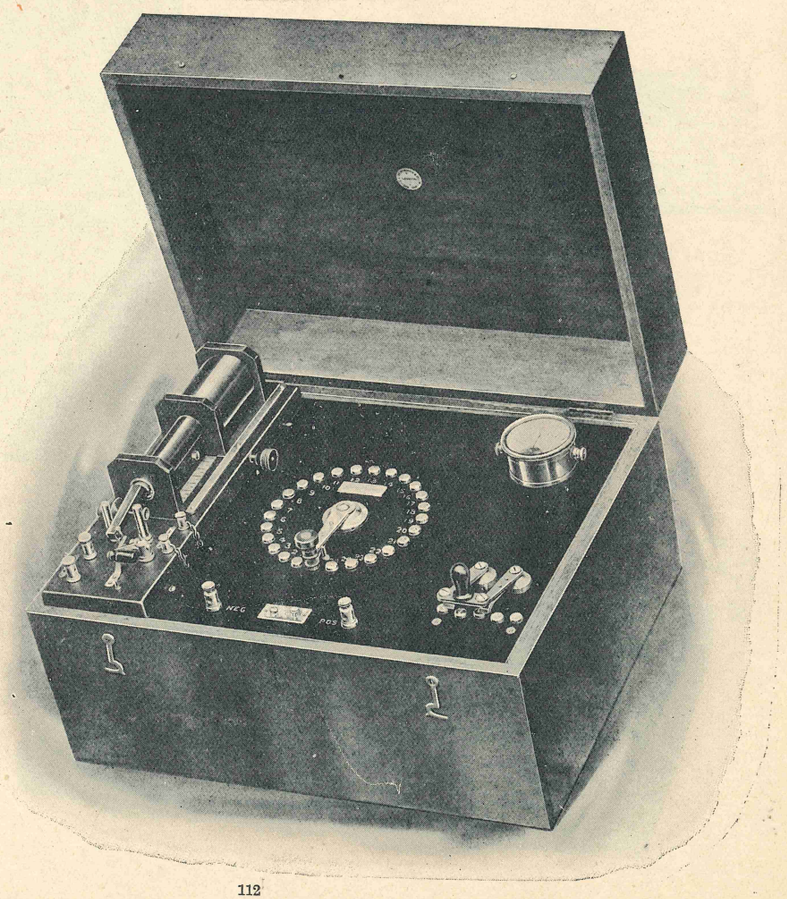
Galvanic Battery for Ionic Medication and Electric Massage. Recommended for use where it is not possible to use the current from the main supply and for use in the house of patients. This Battery is fitted with 20 dry cells, a current reversing switch, a circular cell collector and terminals for connecting to patients.

Price without Milliampmeter

£8 8s. 0d.

Fitted with Centre Zero Shunt Milliampmeter

£10 10s. 0d.



COMBINED BATTERY TYPE "E."

A full range of Galvano-Faradic treatment can be obtained from this battery.

It is fitted with a faradic wave coil, centre zero shunt milliampere-meter current reversing switch, 25 stud circular cell collector.

Twenty-five cells are fitted giving 37 volts.

This battery is highly finished, all parts being nickel plated and the whole is contained in a black ebonised cabinet.

A real efficient electro-medical unit where main current is not available.

PRICE COMPLETE

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TWO SIMPLE and PRACTICAL DIATHERMY APPARATUS

FOR

PROFESSIONAL USE

The term " Diathermy " is derived from the Greek words " Dia," meaning through, and " Therme," meaning heat, and was introduced in recognition of the fact that a Diathermy current generates heat *within* the tissues as distinct from the application of heat to the surface of the body.

The principal characteristic of Diathermy, unlike other currents used in therapy, is that it has no exciting influence on the motor and sensory nerves whatever, and therefore does not contract the muscles but produces heat without giving the patient any other sense of feeling except that of a pleasant warmth.

Diathermy produces hyperæmia not only of the smallest but even of medium sized blood vessels, and this effect takes place principally in the depths of the tissues, the skin remaining more or less uninfluenced, differing in this respect from the ordinary application of heat.

The increase of circulation produces also an increase of leucocytes. Diathermy increases the rate of metabolism, eliminates toxic and waste material, relieves congestion and pain and relaxes irritated nerves.

A Diathermy current is produced from a main supply of alternating current. This alternating current is brought to a very rapid stage of frequency, the oscillations generally amounting to over *one million per second*, by means of multiple interruptions, condensation and oscillation.

MODEL A. Portable Pattern, consists of a British made apparatus for Diathermy (Medical and Surgical) and High Frequency Treatment. It is contained in a handsome carrying case and is portable in every sense of the word. The spark gap is fitted with air-cooled tungsten points—a special feature to which much attention has been given. The current is fully controlled by means of a multi-stud rheostat.

A full range of electrodes are included for Diathermy and High Frequency treatment, fitted inside the lid.

Price complete ... ... **£18 0s. 0d.**

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Complete with electrodes and accessories ... ... **£28 0s. 0d.**

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MODEL A.

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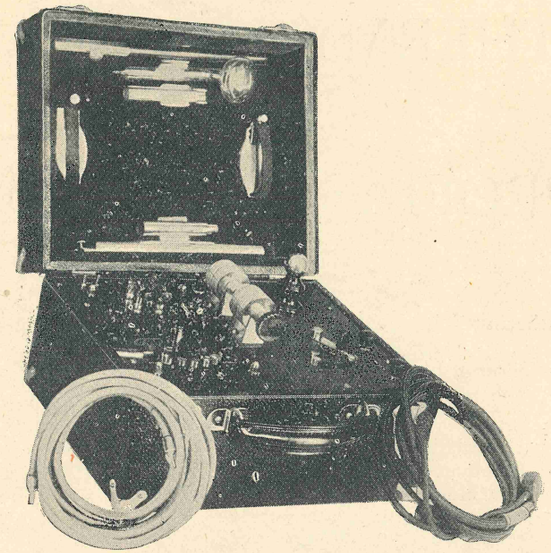

Complete with all Accessories as Illustrated
£18.

GUARANTEED EARTH FREE

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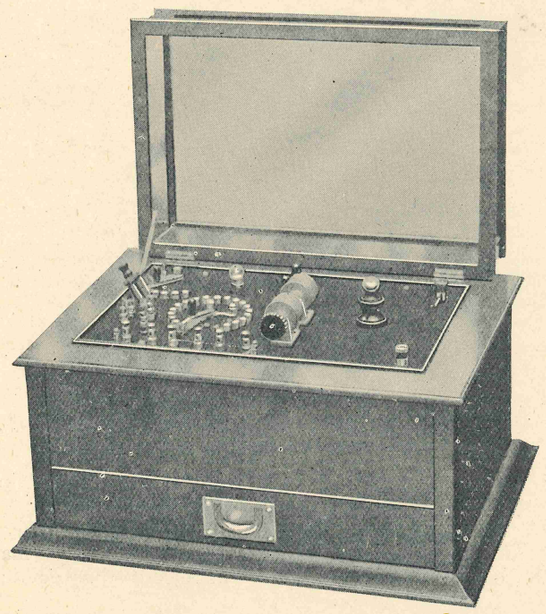
Table Pattern Suitable for Use in Consulting Room or Surgery.



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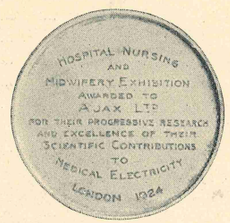
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